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THE FAMILY PHYSICIAN, THE GENERAL PRACTITIONER, AND THE INTERNIST

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A program to train students for practice as family physicians must satisfy certain stringent requirements. The family physician's practice is not limited to internal medicine, and his training must be much broader. It must provide experience in obstetrics, pediatrics, and psychiatry. It must prepare him to deal with emergencies in a way that will facilitate, not hamper, the subsequent work of the specialist. The program wherever instituted must have an adequate administrative framework. It should lead to certification and should offer the physician an opportunity to achieve status, honor, and recognition not only before the laity but before the eyes of his professional colleagues. This can be achieved by replacing the present 12-month internship with a 24-month program based on internal medicine but broadened to give the necessary range of experience.

IN a previous article [1] I attempted to develop the reasoning behind my belief that the ambitions of those seeking identity and training as general practitioners and the ideals of those claiming the role of family physician for the internist were actually one and the same. In this present article it is not necessary to repeat my reasoning, and anyone interested in the background leading up to this present paper is encouraged to read the other paper. The two articles represent a continuing thought.

Stated briefly, a basic problem seems to be present in the American medical education scheme: the present graduate, although duly licensed and therefore legally identified as a "physician and surgeon," is not in reality prepared for the role of "general practitioner" or "family physician." Special committees of the American Academy of General Practice and of the American Medical Association have been at work, attempting to define first a family physician, second what his "privileges" (surgery? obstetrics?) should be, and finally what training program is necessary to create this product.

Primarily at the behest of the American Academy of General Practice a host of general practice residencies were established after World War II. These have as a group been unsuccessful (with certain excellent exceptions). Further pressure by the Academy of General Practice has been directed toward urging the establishment of departments of general practice in medical schools. This idea has met with a cool reception from medical school faculties.

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In response to these two previous comments, first the unsatisfactory results of general practice residencies and second the antipathy of medical school faculties to departments of general practice, one might challenge me and say, "Yes! That is exactly the problem. The professors in the ivory towers are defending their specialty citadels, handling patients and their diseases piecemeal, and wilfully preventing the training of true general practitioners."

Not pretending to speak for academic medicine, but speaking for myself as a practitioner and teacher, I would rebut this challenge by saying, "If your definition of a general practitioner includes the right and privilege to dispense all forms of medical, surgical, and obstetric care, then I am not in sympathy with any present program claiming to give a man this degree of proficiency." (Again, for the purpose of brevity, I refer the reader to my previous article.[1] There I attempted to spell out my reasoning.) If we are agreeing that a degree of restriction is necessary and that the health of the American public can best be tended by making our basic medical school product a family physician, a personal physician, then we can quickly establish a mutual goal. Further, if the proponents of the academy and of the general practitioner would agree that family practice is that aspect of medical care performed by the doctor of medicine who assumes comprehensive and continuing responsibility for the patient and his family, regardless of age, then there is perhaps a readily available solution.

Proposal for the Family Physician

I have indicated above that medical school faculties have not adapted well to the idea of departments of general practice. The administrative framework of a medical school is developed on a specialty structure, because in the minds of most this best serves as a workable administrative unit, a useful teaching unit, and a superb patient-care unit. The criticism, often expressed, that the patient is treated by fragments and not as a whole in this atmosphere is simply an unreal appraisal.

The present internal medicine residency programs, with an internship and three years of residency, produce physicians who are almost perfectly trained for the role of "family physician." I have inserted the word "almost" because the present-day residency program in internal medicine, in many ways, trains the man too narrowly. He acquires a high order of ability to think in terms of physiological medicine and to balance this with an understanding of the human being. In full urban life, or large clinic life, the internist represents the best concept of a personal physician. However, he is too finely trained. His role as a family physician is weakened and his usefulness materially lessened by his relatively inadequate training in care of newborn infants, prenatal care, emergency and traumatic surgery, medical gynecology, physical medicine, and general problems of the eyes, ears, and skin. I appreciate that varying residencies in internal medicine will in varying degrees offer training in these areas; however, my general proposition, that the present-day internist is not well trained in problems of pediatrics, gynecology, and other fields mentioned above, seems a sound premise.

I reiterate: 1. The American public's best interest, from the standpoint of medicine, will be served if the basic unit of our medical structure is a personal, family physician. 2. The family physician must be able to give medical care to all family members regardless of age—must be prepared to minister to a patient in normal labor, care safely for an emergency, perform traumatic surgery, recognize surgical and subspecialty problems, and integrate the indicated specialist into the management. 3. The present graduate of our medical schools, following an internship, does not measure up to this need. 4. The training program of internal medicine prepares a man well for this role but in certain areas offers too restrictive a program. 5. The family physician must have status, honor, and recognition not only before the laity but before the eyes of his professional colleagues.

I have added item 5 because this has been a primary, although often not expressed, factor in the unwillingness of medical schools to set up general practice programs, on the one hand, and the militancy of the Academy of General Practice on the other. The image of the "general practitioner," as stated by his proponents, has not in major ways agreed with the daily observations of many, in and out of the medical schools. The need for "status" is a simple, basic, understandable urge, but the role claimed for the general practitioner by some has exceeded the true dimensions, in the experience of some critics.

If there is a real need for family practitioners, a very reasonable query would be to ask why the general practice residency programs have not succeeded. I think the generally poor long-term performance of the general practice residencies can be explained in basic terms of morale, prestige, and purpose.

First, the administrative unit of a teaching hospital does not provide an "identification" for a general practice residency. The program "belongs" to no department. No senior administrative figure controls the program. The very nature of such a residency cuts across departmental lines, and in so doing does not gain the vigor and strength of any single major department. The administration of the program is usually the duty of a committee (a synonym for lack of administration), or, even more futilely, an unfortunate young general practitioner attempts, as a part-time responsibility, to guide the program without offending the various departmental empires.

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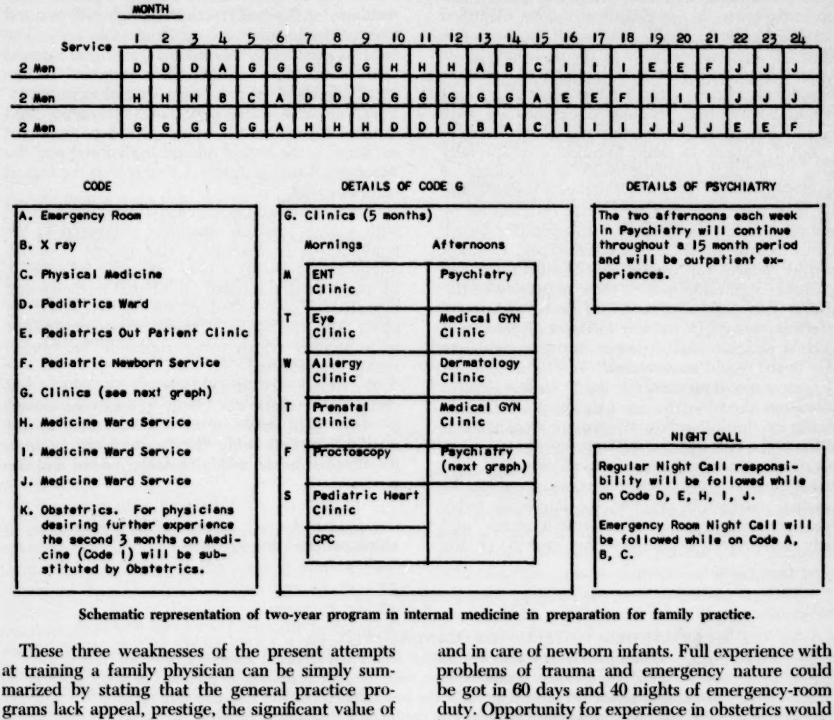
The resident participant in such a program loses the very real and significant value of "belonging" to an established, authentic department. This isolation and separateness is a true deterrent, which, along with the problems of administration, makes the general practice residency impotent.

Further, the value of Board certification is readily apparent to the young physician. The premium value of certification relative to the military, the Veterans Administration, and clinical groups is common knowledge. Therefore, the young man who is considering postgraduate training prefers to invest these years toward Board credit.

It must be a program which will satisfy certain stringent requirements, such as making full use of the present administrative structure of a medical school as a logical extension of the department of internal medicine, so as not to add new burdens to the curriculum but instead use existing effort. The program must also provide experience in psychiatry, to prepare for continuing experience at an office level. It should provide an increasing responsibility in the practice of broad general medicine, perhaps in a nine-month program divided into three-month increments of increasing responsibility, and in pediatrics, in the ward and clinic (general pediatrics),


MONTH
Service
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
2 Men D D D A G G G G G H H H A B C I I I E E F J J J
2 Men H H H B C A D D D G G G G G A E E F I I I J J J
2 Men G G G G G A H H H D D D B A C I I I J J J E E F
CODE
A. Emergency Room
B. X ray
C. Physical Medicine
D. Pediatrics Ward
E. Pediatrics Out Patient Clinic
F. Pediatric Newborn Service
G. Clinics (see next graph)
H. Medicine Ward Service
I. Medicine Ward Service
J. Medicine Ward Service
K. Obstetrics. For physicians desiring further experience the second 3 months on Medicine (Code I) will be substituted by Obstetrics.
DETAILS OF CODE G
G. Clinics (5 months)
Mornings Afternoons
M ENT Clinic / Psychiatry
T Eye Clinic / Medical GYN Clinic
W Allergy Clinic / Dermatology Clinic
T Prenatal Clinic / Medical GYN Clinic
F Proctoscopy / Psychiatry (next graph)
S Pediatric Heart Clinic
CPC
DETAILS OF PSYCHIATRY
The two afternoons each week in Psychiatry will continue throughout a 15 month period and will be outpatient experiences.
NIGHT CALL
Regular Night Call responsibility will be followed while on Code D, E, H, I, J.
Emergency Room Night Call will be followed while on Code A, B, C.

Schematic representation of two-year program in internal medicine in preparation for family practice.

These three weaknesses of the present attempts at training a family physician can be simply summarized by stating that the general practice programs lack appeal, prestige, the significant value of certification, and, finally, an administrative framework.

Solution

Solutions to these problems might be gained by a program, offered by medical schools and at central teaching hospitals, modeled on these concepts: After graduation from medical school, a 24-month training program in family practice should be offered (see figure).

and in care of newborn infants. Full experience with problems of trauma and emergency nature could be got in 60 days and 40 nights of emergency-room duty. Opportunity for experience in obstetrics would be elective and, if chosen, relative to the student's experience. Experience with office manifestations of specific organ diseases, such as those of the eye, ear, nose, throat, and skin; allergies; disease of the rectum; prenatal complications; medical gynecology; and pediatric heart disease, as well as experience with possibilities of physical medicine and rehabilitation, would be included. Finally, some experience with radiology—the role of atomic

medicine, safety problems, interpretation of films, and the adequate preparation of patient—is necessary. The program must be acceptable as graduate training by other Boards. During the entire period the physician would function as a resident in medicine, responsible to the department head and participating in all administrative functions of the department of medicine.

This two-year program would be the basic, initial training program for all men preparing for certification in internal medicine. At the conclusion of this initial two years an examination would be given by the American Board of Internal Medicine. This examination might be designated part 1, and on completion the graduate would be identified as a diplomate in family practice of the American Board of Internal Medicine. If the diplomate elects to go ahead with part 2 of his internal medicine board examination, a further two years of training would be required, leading to examination with certification as a diplomate in internal medicine.

But if, instead, he elects to follow a subspecialty area of internal medicine, such as cardiology or gastroenterology, this second two-year period could be in a restricted area with final certification by examination by the particular subspecialty Board. Other Boards should be approached and their approval gained for the initial 24-month training program applicable toward their respective certification. Obviously, the American Board of Internal Medicine would be the key to the acceptability of such a program and a proper initial approach to the Board would be essential.

Such a program resolves the criticisms I have cited and also serves to eliminate the present weaknesses in the internship. By present weaknesses I refer to the fact that our 1959 graduates are having major clinical experiences in medical school, and the general rotating internship no longer serves its original purpose. In practice, the internship today has become a period of "academic let-down" and only infrequently continues the growth of the student at the junior and senior pace. Today's graduate has had bedside clinical experiences for at least two years and his level of practical experience eliminates the original purpose of the internship. Today's graduate has a considerable background in obstetrics and in general is well prepared to assist normal labor. The rapid improvement of medical school curriculums has simply pre-empted the original role of the intern.

A program such as this would effectively bring the medical schools, their teaching beds, and their departmental administrative staffs into this field. The real need for a physician who can function as a true family physician is already upon us. The Academy of General Practice has rightfully insisted that academic medicine recognize this need. The finished product of the present training in internal medicine is, by exclusion, not prepared in the specific fields of prenatal care, care of newborn infants, medical gynecology, and emergency and traumatic problems—however, the department of medicine is the logical administrative unit and the American Board of Internal Medicine is the logical certifying unit.

Our present medical school graduates leave school with a high level of experience compared to the graduates of 15 years ago. The present 12-month internship represents a poor utilization of time. A 24-month program, based on internal medicine and broadened as described in the figure, would, in series with the medical school preparation, result in a product which could rightfully be labeled family practitioner.

The American College of Physicians is the logical group with whom the family practitioner should identify. This honor, with the associated Board certification, will bring the family physician into the honored circle which he seeks, needs, and deserves.

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ATTITUDES TOWARD THE HANDICAPPED.—As a group parents fear a child's becoming disabled. A mother feels instant relief at learning a newborn child is physically whole, while a sense of guilt is evoked by presence of a handicap. Parents are hesitant to allow the handicapped child to associate with those who are not. Unconscious beliefs that disability is contagious increase the social isolation of the handicapped child. . . . Awareness that disability can happen without parental fault will permit parents to accept disabled children and allow the nonhandicapped to associate freely with the handicapped. A positive social climate can do much to eliminate restrictions placed on the disabled and alleviate the problems of discrimination. If those of us in rehabilitation would add, to knowledge and skill, sensitive understanding of man's common humanity, our professional attitudes would reflect empathy rather than sympathy, respect rather than tolerance, and acceptance rather than pity. William Gellman, Ph.D. (Jewish Vocational Service), Roots of Prejudice Against the Handicapped, *Rehabilitation Literature*, June, 1959.

CAREER-RELEVANT VALUES OF MEDICAL STUDENTS—A RESEARCH NOTE

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Concern with changes in career-relevant values of medical students as they progress through school sometimes turns attention away from commonly held values which do not change although less common values become somewhat more important. A recent survey conducted by the National Opinion Research Center provides data which can be used to study changes in both kinds of values among medical students.

The survey was conducted in the spring of 1956; 1,086 male medical students in 44 medical schools were interviewed. A sample of accredited schools was drawn after the schools had been stratified by major census region and public-private financing; student names were then drawn at random in each school. Interviews were completed with 97.5% of the students in the sample. The survey was conducted to gather information relevant to the Army Medical Service's efforts to recruit junior medical officers and was supported by the Research and Development Division, Office of the Surgeon General, Department of the Army. The extensive findings have been reported by Cahalan and Collette,[1] and a summary of some of the findings has been given by Cahalan, Collette, and Hilmar.[2] This secondary analysis was done incidentally to research planning undertaken at the instance of and with contract funds provided by the National Institutes of Health.

A representative sample of students in 44 approved medical schools in the United States were asked to evaluate the importance of several considerations in deciding on the kind of careers they would prefer. The form of the question was as follows: "I'd like to know how important certain considerations will be to you personally in deciding on the kind of medical career you would like to have. Would you say that . . . would be: very important, fairly important, or not at all important?" Of the considerations the students were asked to evaluate, three deal with the central part of the doctor's role, his contacts with patients; two deal with the intraprofessional part of his role, his relationships with colleagues; and two deal with individual matters of medicine as an occupation. In the order named the items are as follows: (1) having the opportunity to know your patients well, meeting particularly challenging diagnostic problems, and having patients who will appreciate your efforts; (2) having enjoyable relationships with colleagues, and having prestige within the medical profession; and (3) being able to establish your own hours of work, and making a good income.

Student ratings of the last two items suggest that students become more concerned with matters extrinsic to medical practice as they move through their medical school training. (These data deal with different students in each year of medical school, not with a panel followed through its medical school career. However, the drop-out from medical schools is so low that there is only slight danger in concluding that differences between successive classes probably reflect changes in the attributes of students as they move from one school year to the next.) As the table shows, the percentage of students who think that making a good income is very important rises in successive school years. The survey also indicates that the percentage who feel that being able to establish their own hours of work is very important also rises, going from 12% of the freshmen to 21% of the seniors.

Taken alone these data suggest that medical students become more concerned with their occupational self-interest as they move through their medical training. The impression is strengthened when one looks at the year-by-year increase in the percentage of students who say that having prestige within the medical profession is very important, a change from 22% of the freshmen to 36% of the seniors. However, the percentage of students who feel that income, control over hours, and professional prestige are very important is always a minority. In each school year the considerable majority hold that income, hours, and prestige are of only fairly great importance in their career preferences.

In the area of intraprofessional relationships, students in all years put a higher valuation on pleasant relationships with their future colleagues than they do on having prestige in the profession. From 64 to 72% of the students always agree that having pleasant relationships with colleagues is very important, whereas, at the most, 36% feel that prestige is very important.

In each school year the students are rather evenly divided on the question of whether it is very important to have patients who will appreciate their

From the National Opinion Research Center, University of Chicago.

efforts. Slightly increasing percentages, from 50% of the freshmen to 58% of the seniors, think that it is very important.

A similar division of opinion occurs in another national sample of medical students. They were asked a question phrased in personal versus professional terms: Would you prefer a patient who wants to know you only on a doctor-patient basis or a patient who wants to know you also on a friend-to-friend basis? The year-by-year differences are slight, with the following proportions who prefer a patient who wants to know them on a friend-to-friend basis: freshmen, 58%; sophomores, 57%; juniors, 62%; and seniors, 49%.[3]

When one turns from the way in which the students want patients to behave toward them to the way they, as doctors, expect to behave toward patients, the even split of opinion disappears and a strong majority opinion emerges. About three-quarters of the students in each school year say that having the opportunity to know their patients well will be an important consideration in their career preferences. Seventy-two per cent of the

Importance of Making a Good Income, Valuation by Year in Medical School

	Freshmen, %	Sophomores, %	Juniors, %	Seniors, %
Very important	11	13	17	21
Fairly important	79	77	78	75
Not at all important	10	10	5	4
No opinion and no answer	0	*	0	0
Total no. queried	286	280	271	249

* Less than 0.5%.

preclinical students and 64% of the clinical students say that meeting particularly challenging diagnostic problems will be very important.

In making their evaluations practically all of the students were apparently thinking in terms of a medical career which involves constant contact with patients. Only 5% said that they would prefer to devote their main career to working with medical problems that do not require frequent contacts with patients, and only 4% were uncertain of their preference, while 91% preferred to work directly with patients most of the time. Furthermore, preference for frequent contact with patients does not seem to change in the course of medical school training; the distributions of preferences do not vary more than 4% among the students in different years of medical school.

Taken together, the students' evaluations indicate that a majority of students in each year of medical training feel that their professional dealings with their patients and friendly relationships with colleagues are of first importance as bases of career preferences. Control over working hours, making a good income, and having professional prestige consistently hold a place of lesser importance for most students.

Several recent studies [4] of medical students have dealt with the apparent decrease in idealism as students go through their medical school training. In a longitudinal study of the students at an Eastern university medical school Eron [4a] found that the mean score on his cynicism scale was significantly higher among seniors than it was among the same students as freshmen. On his humanitarianism scale the mean freshman and senior scores were similar but the number of students who scored lower as seniors was twice that of those who scored higher as seniors.

Becker and Geer [4b] find that the students' cynical expressions relate primarily to the situation of students in medical school and not to medical practice. The students whom they observed retained many of the ideals of medical practice with which they had entered medical school but apparently postponed the time to which they considered them to apply. In addition they acquired "professional idealism," the intention to live up to the ideas of practice which they had learned in medical school even though they know that most doctors do not have time to do so.

The findings of this secondary analysis suggest that some of the apparent decline in idealism may come from the year-by-year increase in the proportion of students who consider that a good income, control over working hours, and prestige are very important. The increase in the size of the minority in the extreme category may obscure the fact that a considerable majority of students in each school year evaluate these matters as no more than fairly important.

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USE OF PRIVATE MEDICAL PATIENTS FOR TEACHING PURPOSES IN THE COMMUNITY HOSPITAL

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With the increased medical insurance coverage of the average American family, the teaching or "staff" case has become so scarce that in recent years medical educators have had to think in terms of utilization of private patients for teaching purposes. The present paper is a brief outline of the success that the medical service of the Rochester General Hospital has had in using private patients for intern and medical resident teaching during the past three years (1956-1959).

The Hospital

The Rochester General Hospital is a 417-bed, nonprofit, community hospital which is affiliated with the University of Rochester School of Medicine and Dentistry and Strong Memorial Hospital. It consists of two divisions, the Westside Division, located near the heart of Rochester, and a Northside Division, located near the northeast periphery of the city. The medical service has a total bed capacity of 103, of which 68 are located at the Westside Division and 35 at the Northside Division. Since the emergency department is located in the Northside Division, the medical cases there tend to be of the more acute type, while those at the Westside Division are more in the area of difficult therapeutic or diagnostic problems. Optimally, there are 6 medical interns and 10 residents. This number includes a resident covering the hematology service and one the cardiopulmonary laboratory.

Evolution of the Teaching Program

In 1953 it became evident to the medical service of the Rochester General Hospital that private patients had to be utilized for teaching purposes in order to maintain the volume of teaching material available to the intern and resident staff. This preceded by two years the appointment of a full-time physician to be director of medical education in 1955. At this time, a philosophical change had to occur in the minds of the attending staff in order to allow, for the first time, another physician, the director of medical education, to make rounds on their private patients. In the beginning, a small amount of resistance was manifest, which soon abated when the great benefit to the house staff and improved patient medical care became evident to all. At the present time, the director of medical education is head of the department of education and holds a seat on the medical board of the hospital. In a teaching capacity, since he is a board-certified internist, he sees problems regularly on the medical service and coordinates teaching on the other services. It should be noted that the function of the director of medical education is not limited to house staff education. For example, in 1958, a seminar on medical education was conducted for the chiefs of services by a group of specialists in education from a nearby city.

Private Rounds

In 1956, after much controversy, private rounds by an attending physician twice weekly on each private medical floor became a reality. Each month four attending physicians are assigned to rounds, two on staff and two in private medicine. These assignments, made by the chief of medicine, are according to the teaching ability and professional qualifications of the physicians. Rounds are conducted twice weekly on the private floors and three times weekly on the staff floors. At the start of this program, the proviso was added that any physician desiring it could write in the order book that his patient should not be used for teaching purposes. It is interesting that on no occasion during the three-year period has this privilege been used. In reality, it can be said that virtually every private patient has been a teaching case over this three-year period, and the results of a recent house-staff questionnaire indicate that, in all instances, teaching on the private floors has been equally as successful as that in which staff patients were used. The "rounding" on the private floors either follows the plan of observation of a single interesting problem case with detailed discussion after the bedside presentation and examination or of the more conventional rounding exercise with several patients being seen during the course of the rounds. If, in the discussion, certain diagnostic or therapeutic suggestions are thought to be indicated, these are subsequently brought to the attention of the private physician by the interns. The duration of the rounding exercise has been on an average of one and one-half to two hours.

Patient Reaction

Almost universally, patients have been eager to be seen on teaching rounds, and some have expressed their favor at having what amounts to a

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consultation at no added expense. If a patient desires to have no rounding conducted, he has the privilege of asking his physician to write "no rounding" in the order book. The favorable patient reaction has indeed been most gratifying to the original proponents of this teaching program.

Staff Reaction

Of major significance and great interest is the fact that the few physicians who reacted most strongly against the starting of such a rounding program are now among its heartiest proponents. Many physicians feel that the community health of Rochester has improved with this program, since in many instances difficult medical problems have the benefit of another physician's thinking. Though slightly fewer medical consultations have been held, this has not resulted in any major change in the consultation service per se and has created no animosity on the part of the physicians rendering this type of service. This may in part be due to the fact that most of the rounding physicians are the ones most likely to be chosen for consultation purposes, since training and experience are major factors in the choice of a good rounding physician. There has actually resulted, since the advent of this program, an increased number of consultations from other services.

Summary

Every hospital is a potential teaching institution. In this day, with the diminishing number of staff or ward patients available, many hospitals find that they must use private patients for teaching purposes. The experience in the utilization of private patients in teaching at the Rochester General Hospital for three years has been extremely gratifying.

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DECLINE IN QUALITY OF MEDICAL TEACHING

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The Second World Conference on Medical Education, sponsored by several organizations including the American Medical Association and held in Chicago, Aug. 30 to Sept. 4, 1959, focused part of its attention on the problem of recruiting, training, and retaining talent in medical education. It is not surprising, perhaps, that the conferees from the industrially underdeveloped countries such as India and Indonesia should report that in their countries the salary scales for teachers are so low that recruitment of able persons for full-time teaching and research in the basic medical sciences is extremely difficult, or even impossible. In fact, a former officer of the World Medical Association from India stated that in his country it was virtually only those persons who could not succeed in the practice of medicine who became teachers, quoting the old saw, "he who can, does. He who cannot, teaches."

Oddly enough, the situation in the richest country in the world, the United States, is acquiring sufficient resemblance to that in the poorest countries to warrant serious consideration. The parts of the world in which there is the greatest real competition for academic posts are the moderately wealthy regions such as Scandinavia, Switzerland, Belgium, Germany, Holland, and the United Kingdom.

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The conferees from the United States were in agreement that a serious shortage exists in the supply of preclinical medical science teachers. Scores of budgeted vacancies in basic science departments exist in U. S. medical schools. Furthermore, actual vacancies tell only a small part of the story, because in most instances, when a position cannot be filled with a candidate of caliber, the institution lowers its sights and appoints someone of less than optimal ability and training. In fact, it is this practice that is most damaging to medical education and to the ultimate public interest.

The fact that the American culture has not, in spite of the many hundreds of millions of dollars used annually in medical teaching and research, been able to make academic careers in the basic medical sciences as attractive as they are in the less wealthy but culturally more mature countries of the world is disturbing as far as the future of medicine is concerned. It is unrealistic to suppose that, in general, high-grade products are going to come out of schools with inferior teachers. The very immensity of the annual investment in medical teaching and research demands that every effort be made to make that investment productive. It could become a national scandal if these hundreds of millions of dollars annually were to be wasted in part by having less than the most competent teachers and researchers control the expenditure.

Many factors enter into the situation which exists in the United States on this score. A superficial analysis might lay almost all of the blame on the relatively low salaries in academic careers. This is unquestionably a large factor, but it is not the whole difficulty. Another major factor is the low social prestige of the teaching profession as a whole in the United States. This in turn is again partly a result of the low economic rewards in a culture in which dollars are much more the yardstick of success than is the case in European cultures. Still another discouragement to young medical students against entrance into academic careers is the inadequacy of their basic science and mathematical training in high schools and colleges. They see a long, hard road ahead of them if they choose such careers.

Also, lowering of the average age at marriage means that most medical graduates now have a minimum of two mouths to feed. They also face the necessity of spending time with their wives and children which, if they were single, could go into study.

The net result of all these factors is that basic medical science in the United States is in danger of serious deterioration in quality. The expansion of the total educational enterprise is, if anything, making it worse rather than better, because the dilution with less than first-rate scholars will be progressive. The government, the foundations, the universities, the medical profession, and especially the public—all have a vital stake in the matter. Each of these agents already has taken some cognizance of the facts, but adequate solutions are not yet in sight. Universities are raising salaries, but salaries for most basic science teachers are still far below levels at which a university professor could send three or four children through college without dissipating his lifetime savings. Foundations are making contributions to the training of recruits, as is the government. The latter two are also making almost unbelievably large sums of money available to support research. Actually, it is open to question whether in the long run it would not be preferable to put significant fractions of this support for research into making research and teaching careers more attractive, so that competent persons will become the medical scientists of the future.

As a working medical educator I have seen in recent years, that is, since the inflation after the Korean war, a definite change in the caliber of students who consider entering academic careers. In the department in which I have worked for 20-odd years, the fraction of applicants for graduate work which we are obliged to turn down has increased greatly, and not because our requirements have been raised. Today, many more of our applicants come from the "disappointed premed" group and others from the lower fraction of medical school classes. Fortunately, we do, to be sure, still get a few of the top caliber students, but the number is not large in spite of attractive scholarships and active recruitment. A more basic change in the situation than the availability of scholarship help during training is going to be necessary to solve the problem.

This change, I think, will have to involve at least two conditions. First, there must be greater economic incentives; second, there must be an improvement in social attitudes toward academic careers. In the United States, the first will in time undoubtedly act toward bringing about the second.

The medical profession has, next to the public at large, the greatest stake in the solution of these problems. American medicine can coast for perhaps 10 years on its own momentum, but for the sake of the long-term future the American medical profession today should have at least as much interest in preventing deterioration as it had a half century ago, at the time of the Flexner report, in improving the status of medical education. The American Medical Association at that time led the crusade to eliminate inferiority and incompetence from medical education. It now has the opportunity to lead the forces working to maintain superior quality in American medical education. The American Medical Association won the battle in the first quarter of the century. The problem is undoubtedly more difficult today because it cannot be attacked through control of accreditation and licensure. Mediocrity cannot be prevented or abolished by law. It can only be eliminated by competition from superiority.

The positive weight of influence of the American Medical Association in favor of the use of some of the funds now devoted to the advancement of medical research in this country, or the provision of additional funds, for improvements in the quality of talent of persons entering academic careers in fundamental medical science would go far in accomplishing the objective. Such a position would be in line with the historic role of the Association in promoting excellence in American medicine and would strengthen the confidence of the public and the educational world in the sincerity of the Association in its claim to leadership in American medicine.

It is difficult to estimate the actual cost in teachers' salaries of medical education in the United States. This is partly because research and teaching functions are combined in varying ratios in the same persons. This is as it should be, but the research function should be recognized as such and research funds should properly carry their appropriate share of the total cost of academic staff salaries. This cannot be done unless medical research is supported on a more secure long-term basis than it is today. Universities cannot appoint permanent staff members on five-year grants. Institutions should, perhaps, have access to support

that would allow them to appoint staff members at higher salaries to posts with life tenure through use, in part, of funds that are earmarked for research. On the other hand, more funds available to institutions for use interchangeably for either teaching or research might be preferable. There are undoubtedly many possible ways to solve the problem. The most important thing is the recognition that a serious problem exists. With that recognition will come, one may hope, a determination to solve it somehow. It would be an unbelievable stupidity if the richest country in the world were to handle its affairs so ineptly that it would one day soon approach the condition of the most underprivileged countries with regard to medical education. If it comes to such a pass here that "he who can, does. He who cannot, teaches." it will be a sorry day for American medicine. The dry rot of mediocrity can be the penalty of richness as well as poverty. It will, I predict, be our fate in medicine unless we move more vigorously and more intelligently than we have in the past decade.

TEACHING OF ANESTHESIOLOGY IN MEDICAL SCHOOL

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There is a continuing need for adequately trained anesthesiologists. Physicians and medical educators should recognize the importance of teaching anesthesiology to students and of including this specialty in the curriculum. The course here described provides for the introduction of certain graded work in each of the four years of the curriculum. It calls for careful integration with the work in other departments and for the active interest of the teaching staff. Although the teaching of anesthesiology as a specialty is primarily a postgraduate problem, this plan has been highly successful in focusing the student's attention on the fundamentals of anesthesia and resuscitation. It has also served to clarify the relationship of the patient as an individual with disease or diseases to the mental and physical trauma of an operation.

Anesthesiology is a youthful, vigorous specialty among medical disciplines. A national organization was founded in 1936 and incorporated under its present name, "American Society of Anesthesiologists," in 1945. The American Board of Anesthesiology was established as a major specialty board in 1942. Unbounded by traditions and unlimited by strict syllabus outlines, departments of anesthesiology have developed along many pathways.

This report concerns the philosophy and methodology employed in the instruction of students at the Albert Einstein College of Medicine, Yeshiva University. The teaching of anesthesiology is primarily a postgraduate problem, but a department functions in all four years of the curriculum. Two primary problems are undertaken here. The first centers about the belief that resuscitation is an important aspect of training, better taught to physicians by anesthesiologists than by lay groups. The second involves the relationship of the patient as an individual with disease or diseases to the mental and physical trauma of an operation. The solution of these necessitates teaching in all four years by an active, interested, enthusiastic staff.

First-Year and Second-Year Programs

During the first year, on completion of the anatomy program on the vertebral column and spinal cord, the department of anesthesiology offers a two-and-one-half-hour demonstration to the entire class. While the departmental chairman lectures on applied anatomy, members of the department demonstrate techniques on patients scheduled for operation. A conventional spinal block with the patient in the lateral recumbent position, a saddle block with the patient in the sitting position, a continuous epidural or caudal block, and a single-injection caudal block are started, each in a different patient. Cerebrospinal fluid is withdrawn. The collecting tubes, needles, and catheters are circulated among the students. While emphasis is placed on applied anatomy and not on technique, this demonstration is often the student's first encounter with actual pa-

From the Bronx Municipal Hospital Center, Albert Einstein College of Medicine, Yeshiva University.

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tients. It becomes an exciting and stimulating experience, leaving a lasting impression. The anatomists relate that the students study the complex anatomy of this region with renewed vigor and intent. The hours are available on invitation from the department of anatomy.

Four hourly didactic lectures and a three-hour demonstration are given in the second year during the course on pharmacology. The lectures cover primarily the theories of anesthetic action and the pharmacology of commonly employed general anesthetic drugs. A brief history of anesthesia is also included. The effects of inhalation agents and ancillary drugs are demonstrated on two patients before the entire class, with continuous monitoring on oscilloscopes of the electrocardiographic and electroencephalographic activities. Induction in the first patient is done with an intravenously given barbiturate and anesthesia is maintained with cyclopropane. An endoctracheal catheter is passed after the injection of succinylcholine, while fibrillatory and muscleblocking effects of paralyzing drugs are discussed. Thereafter, the action of trimethaphan (Arfonad) camphorsulfonate and phenylephrine (Neosynephrine) is shown. The second patient is subjected to anesthesia with a nitrous oxide–oxygen–ether sequence, and intubation is performed under deep ether maintenance. The effects of *d*-tubocurarine and edrophonium (Tensilon) chloride are demonstrated. The electrocardiographic findings characteristic of cyclopropane or ether anesthesia and the relationship of electroencephalographic activity to depth of anesthesia are seen on the oscilloscopes.

Third-Year Seminar

Time is allotted to the department for its own teaching program during the third year. Groups of five to six students are assigned to the service at the Bronx Municipal Hospital Center for a two-week period shared with the department of ophthalmology. The students attend anesthesiology sessions eight full mornings and two full afternoons. A program has been outlined, correlating 10 seminars with clinical activity in operating rooms, electroconvulsive therapy area, recovery rooms, and wards of the hospital. A copy of this outline is presented to the students with a suggested reading list. The first page, the "student's check sheet," is shown in table 1. All seminars are conducted by members of the attending staff. Emphasis is placed on resuscitation and the management of airway problems rather than on technical details of the conduction of anesthesia. The seminars are guided to elaborate the relationship of the patient, his diseases, and surgical requirements to the disciplines of anesthesiology.

The orientation seminar includes a brief history of the development of anesthesiology as a specialty and the role of the anesthesiologist in medical care. The former discusses the development of residency training, the American Society of Anesthesiologists, and the American Board of Anesthesiology. The latter encompasses the activities of the anesthesiologists in the operating theaters and in care of patients with pain problems, nerve blocks, and inhalation therapy in management of airway and respiratory problems, and as consultants throughout the hospital. The students are introduced to clinical problems by a tour of the operating room suites and a demonstration of equipment, both research and clinical. An anesthesia machine is dissected in detail, and fire and explosion hazards are explained.

The second seminar, an afternoon session, deals with the interpretation and importance of anesthesia

TABLE 1.—*Anesthesiology Student's Check Sheet at Bronx Municipal Hospital Center**

Name.....From.....To.....

Seminars	Practical
Orientation	Demonstration of anesthesia equipment
Charting, preoperative and postoperative visit	Preoperative visit
Airway problems and resuscitation, coma and cardiac arrest	Resuscitation Model Patient
Inhalation anesthesia	Demonstration of Inhalation anesthesia
Regional anesthesia	Intravenous anesthesia
Physics and oxygen therapy	Rectal anesthesia
Postoperative care, recovery room	Spinal anesthesia
Discussion of classic case reports, 1	Electroconvulsive therapy clinic
Discussion of classic case reports, 2	Postoperative visit
Discussion of students' case reports	

*Each student is required to submit summary of case—preoperative considerations, anesthetic management, and postoperative course—at last seminar. Recommended reading: Dripps and others[1]; Schwartz, H., and others: Manual of Anesthesiology, Springfield, Ill., Charles C Thomas, Publisher, 1957; Cullen, S. C.: Anesthesia in General Practice, ed. 4, Chicago, Year Book Publishers, Inc., 1954.

records, the value and procedure of the preoperative and postoperative visits, and preoperative care and medication. The students are assigned patients for the next morning and proceed to preoperative rounds on these patients with a senior resident. At 4 p.m. they attend and participate in the department's weekly "case report conference."

The next morning, the students observe the course of anesthesia and operation in the patients seen the preceding afternoon. They start the intravenous infusion, monitor pulse and blood pressure, and maintain the anesthesia record. Once the situation is stabilized, they are allowed to get the "feel of the bag" and conduct the anesthesia with the resident. The seminar consists of a lecture on inhalation anesthesia.

The following morning is devoted entirely to the problems of airway maintenance. A lecture and exhibition of various methods of resuscitation on a

life-size model of the upper respiratory tract is followed by a demonstration on an anesthetized patient. The students participate in the insertion of oropharyngeal and nasopharyngeal airways and the administration of oxygen by mask and bag. Laryngoscopy is demonstrated in a patient and on the model by an instructor. The students practice on the latter (fig. 1). Resuscitation apparatus is shown, but special emphasis is placed on mouth-to-mouth and mouth-to-airway breathing (fig. 2). The management of coma, convulsion, drug poisoning, drowning, "cardiac arrest," and other catastrophic emergencies is also discussed.

Fig. 1.—Laryngoscopy as practiced on life-size model of upper respiratory tract.

The final session of the first week is spent in the electroconvulsive therapy clinic. Under the guidance of a senior member of the staff, the students use this opportunity to administer intravenous anesthetic agents and muscle relaxants and to maintain an unconscious, paralyzed patient. Maintenance with and without an airway is practiced. Ventilation is performed by the students in the manner previously learned, including mask and bag techniques. A seminar on regional anesthesia follows. The seminars on inhalation and regional anesthesia are correlations of the operating room observations and activities to the physiological and pharmacological characteristics of the techniques and agents. They include reviews of anatomy, physiology, pharmacology, and pathophysiology.

Mornings of the second week are spent in elaboration and extension of the operating room activities of the first week. The students are given additional tasks and allowed to administer anesthesia to relatively healthy patients requiring minor surgical procedures. They are never without supervision. During this week the students spend an additional session in the electroconvulsive therapy clinic. They are present during administration of nerve block anesthesia and are in attendance during cardiac surgery.

The first seminar of this week includes the physics of medicinal gases and of ventilation, carbon dioxide retention, vaporization of fluids, and the application to oxygen therapy. The afternoon seminar deals with postoperative care, the role of a recovery room, and of postoperative visits. On this afternoon, the students again attend the case report conference. The eighth and ninth seminars are devoted to discussions of cases selected from departmental files. The cases chosen present problems related to the broad sphere of medicine, such as blood pressure fluctuations during operation and anesthesia, postoperative hypotension, hypoglycemia in a surgical patient with recent hepatitis, or postoperative pulmonary edema from overloading with intravenously given fluids.

Fig. 2.—Mouth-to-airway breathing as practiced on life-size model of upper respiratory tract.

In the final seminar, each student submits a copy of a written report on the management of the patient he saw through preoperative visit, anesthesia, and postoperative period. An outline explained and

given to the students during the second seminar is used as a guide (table 2). The reports form the material for discussion.

Final Lectures and Comment

During the fourth year only two formal lectures are offered to the whole class by the department. These are utilized to elaborate and renew concepts of resuscitation and the treatment of coma. For those students desiring to learn techniques of anesthesia, a two-month elective is offered during the year. Six per cent of the class has taken advantage of this opportunity. Attendance is limited to two students per period. The students electing this service are appointed as substitute interns. They share the activities of the residents with the exception that they may not administer anesthesia without supervision. The department of obstetrics invites one-third of the senior class at a time to a lecture on infant resuscitation.

The outlined curriculum has proved highly successful. Many students have expressed their enthusiasm for the third-year program to their student counselors. Within a framework of 40 hours during the third year, the objectives outlined can be accomplished but only at the expense of personal continuous effort by senior members of the department. Only a few American medical schools have recognized the importance of teaching anesthesiology to students and have prepared a program including this specialty in their curriculum. Dripps and associates [1] recommend clinics during the preclinical years on artificial ventilation, on applied anatomy of regional anesthesia, and on applied pharmacology of drugs used in anesthesia. In the clinical years, seminars, correlation clinics, and experience are offered. Greene [2] writes that those teaching anesthesiology "should be primarily teachers of medicine and secondarily teachers of anesthesia." We cannot but endorse the wide approach to the teaching of anesthesiology rather than the narrow technical aspect. On proper presentation of the scope of the specialty to the undergraduate, there will be no dearth of interns preparing for further training and, some day, no lack of adequately trained anesthesiologists to care for the American public. It needs only effort and interest to teach the value of this subject to physicians and medical educators.

TABLE 2.—*Outline of Anesthesia Report as Used by Students at Bronx Municipal Hospital Center*

Student's Name.....Date.....
Patient's Name.....Age.....Ward.....
History No.....Anesthesia No.....

A. Pertinent history and physical findings
B. Laboratory data
C. Procedure contemplated
D. Choice of anesthesia
   1. Drugs and techniques
   2. Problems relative to
      a. physiological-pathological changes
      b. particular needs at operation
E. Short description of anesthetic management used
   1. Agents
   2. Techniques
   3. Supportive therapy
F. Postoperative follow-up study
   1. Complications, causes
   2. Therapy

Eastchester Road and Morris Park Avenue (61) (Dr. Marx).

References

1. Dripps, R. D.; Eckenhoff, J. E.; and Vandam, L. D.: Introduction to Anesthesia: Principles of Safe Practice, Philadelphia, W. B. Saunders Company, 1957, pp. 250-252.

2. Greene, N. M.: Role of and Responsibilities of Department of Anesthesia in University Hospital, J. M. Educ. **31**:684-690 (Oct., pt. 1) 1956.

EFFECT OF ALCOHOL ON THE ELECTROENCEPHALOGRAM.—The noteworthy effect of alcohol on the EEG consists of the production of sequences of 4-8 cycle waves, with persistence of alpha rhythm in the intervals. The slowing in a given individual is roughly proportional to the concentration of alcohol in the blood, and usually becomes manifest at about the concentration at which obvious signs of intoxication, such as trouble with balance, appear. The same variation in tolerance to alcohol is seen in the effect on the EEG as in other evidence of intoxication. In the small group investigated a tendency was apparent for individuals with more experience with alcohol to show a high tolerance both clinically and electroencephalographically. The EEG change produced by alcohol cannot be produced by any psychological mechanism, either at a conscious or subconscious level. Neither can it be produced as a consequence of any vasomotor or other autonomic change secondary to the emotional state. The reasonable assumption is, therefore, that it is a reflection of the same disordered neuronal activity that is manifested in the more readily assessed attributes of drunkeness.—H. W. Newman, M.D., The Effect of Alcohol on the Electroencephalogram, *Stanford Medical Bulletin*, May, 1959.

VIRAL DISEASE OF THE CENTRAL NERVOUS SYSTEM

INFLUENCE OF POLIOMYELITIS VACCINATION ON ETIOLOGY

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Viral studies were made of 1,407 patients with clinical manifestations of infectious disease involving the central nervous system. Both virus isolation and serologic methods were used. The results showed apparent differences in the etiology of clinical poliomyelitis and aseptic meningitis which correlated with the degree of prior immunization with inactivated poliovirus vaccine. Poliovirus was identified less often, and other viruses more often, among patients with both paralytic and nonparalytic illness who had received the vaccine. The findings also indicated that "nonpolio" enteroviruses have protein pathogenic capabilities enabling them to give rise to a broad spectrum of syndromes embracing the clinical picture of aseptic meningitis, mild to moderate paralytic poliomyelitis, and meningoencephalitis.

A number of investigators have reported the recovery of Coxsackie group B viruses,[1] Coxsackie group A viruses,[2] and several types of ECHO viruses [3] from patients given a clinical diagnosis of nonparalytic poliomyelitis or aseptic meningitis. Certain serotypes of Coxsackie and ECHO viruses have also been etiologically incriminated [4] in some illnesses resembling paralytic poliomyelitis. In a few instances, encephalitic manifestations have also been associated with infection with some serotypes of Coxsackie B virus.

Since these enteroviruses have been found also in fecal samples from normal, non-ill population groups, their etiological significance when found in association with illness, particularly sporadic cases, is often equivocal. That certain types of Coxsackie and ECHO viruses are important causative agents of the aseptic meningitis syndrome is now well established,[5] but further observations are needed to assess their etiological importance in encephalitic and paralytic illnesses.

The advent of killed-virus vaccine has heightened the need to determine how often other viruses may be responsible for illnesses clinically resembling poliomyelitis. Thus, Davis and Melnick [1b] found that poliovirus infection was appreciably less often confirmed in both paralytic and nonparalytic cases of poliomyelitis in patients who had received the vaccine as compared with those who had not.

The purpose of this report is to present a summary of laboratory findings from a three-year study of cases of poliomyelitis, aseptic meningitis, and encephalitis in California, with particular reference to apparent differences in the etiology of illness in vaccinated and nonvaccinated patients.

Study Plan

The laboratory studies described herein were conducted in conjunction with the poliomyelitis surveillance program initiated by the California State Department of Public Health in June, 1955. Close cooperation was maintained with the epidemiology and laboratory branches of the Communicable Disease Center of the United States Public Health Service, Atlanta, Ga. Individual case histories, including clinical and epidemiologic data, and specimens for laboratory study were obtained through the cooperation of local health officers.

From the Viral and Rickettsial Disease Laboratory and the Bureau of Acute Communicable Diseases, California State Department of Public Health.

Initially, in 1955, only cases clinically diagnosed as poliomyelitis, paralytic and nonparalytic, received laboratory study. In 1956 and 1957, the study was extended to cover a broader spectrum of acute infectious diseases involving the central nervous system (C. N. S.), including clinical designations such as aseptic meningitis, encephalitis, and "viral C. N. S. disease," in addition to unqualified diagnoses of poliomyelitis.

Specimens for laboratory study were requested as follows: three or four stools, collected at one-to-three day intervals during the acute phase of illness, and three blood specimens, taken, respectively, when the patient was first seen, 14 days after onset, and four to six weeks after onset. An effort was made to obtain specimens on all patients who had received one or more doses of vaccine and on selected control groups of nonvaccinated patients. In 1955, specimens were requested from all nonvaccinated patients aged 6 to 9 years, to correspond with the age group in which the vaccination effort was concentrated at that time. In 1956 and subsequently, specimen collection from nonvaccinated patients was broadened to include patients of all ages in several selected counties. In this way the

number of nonvaccinated patients subjected to laboratory study approximately balanced the number of vaccinated patients.

Isolation and Identification of Viruses

Stool suspensions were inoculated into monkey-kidney cell cultures for the detection of poliovirus or other cytopathogenic agents. Specimens from about 500 stools, from 250 patients, were also inoculated into suckling mice. All virus isolates were typed either in monkey-kidney cell cultures or colorimetrically in cultures of the FL line of human amnion cells,[5A] with use of monkey-immune serum for each of the three types of poliovirus, Coxsackie virus types B1-B5, and type A9. Isolates obtained in suckling mice were identified by neutralization tests with specific antiserums in suckling mice. Isolates not identified by these procedures are still in the process of being typed against available type-specific serums to the ECHO viruses. Results of the typing to date indicate that ECHO virus types 4, 6, and 9 are represented in this group, but the majority of strains have not been specifically identified. Pending specific identification, these isolates are referred to in this report as "unidentified ECHO viruses."

Serologic Tests

Serologic procedures included complement-fixation (CF) tests for poliomyelitis types 1, 2, and 3 [6]; mumps; western equine encephalomyelitis; epidemic (St. Louis type) encephalitis; and herpes simplex. Initially, serologic tests other than for poliomyelitis were conducted somewhat selectively, and no further tests were done when a positive result was encountered. Later, the complete series of CF tests was done uniformly on each patient. During the first two years of the study a colorimetric neutralization test for poliomyelitis was also included routinely, but, because of the small additional diagnostic returns from this test, it was used selectively during the last year.

Results

Isolation of Enteric Viruses.—From June, 1955, through December, 1957, fecal specimens were examined from 1,407 patients suspected to have an infectious disease involving the central nervous system. The clinical diagnoses could be grouped, as shown in table 1, into one of six categories: paralytic poliomyelitis, 497 cases; nonparalytic poliomyelitis, 593 cases; aseptic meningitis, 120 cases; encephalitis, 124 cases; other diagnoses of C. N. S. disease, 39 cases; and 34 cases of miscellaneous febrile illnesses in which no definite signs of C. N. S. involvement were observed. Grouping was based on the clinical diagnosis as recorded at the conclusion of the acute phase of illness but prior to knowledge of the results of viral studies. In most instances this was the diagnosis given at hospital discharge.

The category aseptic meningitis includes closely similar diagnostic terms such as viral meningitis, nonpurulent meningitis, and benign lymphocytic meningitis. Unqualified diagnoses of nonparalytic poliomyelitis were treated as a separate category. Diagnoses of paralytic poliomyelitis were, in most cases, unqualified. Although in many instances clinical histories indicated that there was only mild impairment of muscle strength, some degree of demonstrable paresis persisting after the acute febrile phase of illness or at the time of hospital discharge was recorded for all cases classified as paralytic poliomyelitis.

The term "encephalitis" includes clinical diagnoses of acute infectious encephalitis, meningoencephalitis, or encephalomyelitis. The category of "other C. N. S. illness" includes cases in which an initial clinical impression of a possible viral C. N. S. disease was discarded on further observation, e. g., purulent meningitis, Guillain-Barré syndrome, Bell's palsy, and cerebral vascular lesion. The term "no C. N. S." refers to patients hospitalized with acute febrile illnesses in which the initial suspicion of C. N. S. involvement was not confirmed, e. g., uncomplicated measles, mumps, influenza-like illnesses, and acute gastroenteritis.

TABLE 1.—*Recovery of Enteroviruses from Patients Hospitalized with Suspected Central Nervous System Disease, California, 1955 to 1957*

Clinical Diagnosis	Total Cases Studied, No.	Virus Isolated, %				No Virus Isolated, %
		Total	Poliovirus	Coxsackie	ECHO (Unidentified)	
Total	1,407	44	24	14	6	56
Paralytic poliomyelitis	497	62	54	5	3	38
Nonparalytic poliomyelitis	593	39	9	21	9	61
Aseptic meningitis	120	45	6	29	10	55
Encephalitis	124	22	2	17	3	78
Other C. N. S. disease	39	13	3	10	0	87
No signs of C. N. S. disease	34	3	3	0	0	97
Cases, no.		624	331	207	86	783

Of the 1,407 patients studied over a three-year period in these clinical categories, 624, or 44%, yielded an enterovirus. Polioviruses were isolated from 331, or 24%, and unidentified ECHO viruses were isolated from 86, or 6%, of the total patients. In 14 instances two different viruses were recovered from the same person. To avoid confusion of numbers in table 1, only one of the isolates from these patients was counted; these patients are considered again later.

Of the 497 patients clinically classified as having paralytic poliomyelitis, poliovirus was recovered from 54%. This low rate of laboratory confirmation of presumed poliovirus infection represents a further decline from rates of about 75% [7] and 60% [8] reported previously from this laboratory and is in

contrast with earlier reports by others who recovered poliovirus from about 90% of paralyzed patients.[9] The discrepancy between these various estimates of the effectiveness of the laboratory diagnosis of poliomyelitis by recovery of the virus from stools is more readily understandable in the light of the variations in virus recovery described below in relation to the age and vaccination status of the patients studied.

Poliovirus was recovered from only 9% of the patients given a clinical diagnosis of nonparalytic poliomyelitis and 6% of those given a diagnosis of aseptic meningitis. Two patients with encephalitis (2%), one patient considered to have Bell's palsy, and one patient with an influenza-like syndrome yielded poliovirus. Coxsackie viruses, including group B, types 2, 3, 4, and 5, and group A, type 9, were recovered from 5% of the patients with clinically diagnosed paralytic poliomyelitis, 21% of those with nonparalytic poliomyelitis, 29% of those with aseptic meningitis, 17% of those with encephalitis, and 10% of those with other diagnoses of C. N. S. disease. ECHO (unidentified) viruses were recovered from about 10% of the patients with nonparalytic poliomyelitis and aseptic meningitis, 3% of those with paralytic poliomyelitis, and 3% of those with encephalitis. It is apparent that the recovery of enteroviruses was not notably different between cases clinically diagnosed as nonparalytic poliomyelitis and those diagnosed as aseptic meningitis.

Serotypes of Polioviruses and Coxsackie Viruses.—The specific serotypes of the polioviruses and Coxsackie viruses recovered from patients in each clinical category are shown in table 2. In the 331 patients yielding a poliovirus, type 1 virus was found in 266, type 3 in 57, and type 2 in only 8. There was no apparent difference in the distribution of poliovirus types recovered in paralytic and nonparalytic patients.

The predominant Coxsackie virus types were B5, recovered from 79 patients, and B4, recovered from 74 patients. Together, these accounted for nearly 75% of the 207 patients yielding a Coxsackie virus. Other types identified were B2, B3, A4, and A9; type B1 was not encountered. A single isolation of type A4 was made in suckling mice. Since only monkey-kidney cell cultures were used uniformly for virus isolation, the data concerning the occurrence of Coxsackie group A viruses are incomplete other than for type A9, which is readily recovered in this cell system. Each type of Coxsackie virus tended to conform to the same pattern of disease association, being associated most frequently with cases of aseptic meningitis or nonparalytic poliomyelitis, somewhat less often with encephalitis, and infrequently with paralytic poliomyelitis.

Annual Differences in Distribution of Coxsackie Virus Types.—Considerable differences were noted in the occurrence of particular types of Coxsackie virus from one year to another. For example, in 1955, Coxsackie viruses A9 and B2 were the most common types. In 1956, type B5 accounted for about two-thirds of the Coxsackie viruses isolated. In 1957, isolations of type B5 declined and B4 was the predominant type. Although varying in relative frequency, all of the types shown in table 2 (except type A4) were encountered each year.

Age and Vaccination Status.—Differences in the recovery of enteroviruses from patients in each clinical category according to the patient's age and poliomyelitis vaccination status are illustrated in the figure. Patients who had received the vaccine were divided into two groups: those who had received a single dose and those who had received two or more doses. Patients given a second dose less than 15 days prior to onset of illness were included with the single-dose group. The small number of vaccinated patients over the age of 15

TABLE 2.—*Distribution, by Clinical Diagnosis and Immunotype, of Enteroviruses Recovered from Patients Hospitalized with Suspected Central Nervous System Disease, California, 1955 to 1957*

Clinical Diagnosis	Patients from Whom Virus Was Isolated, No.	Poliovirus, Type				Coxsackie Virus, Type							ECHO (Unidentified)
		Total	1	2	3	Total	A4	A9	B2	B3	B4	B5	
By number													
Paralytic poliomyelitis	307	267	213	4	50	24	..	3	6	1	7	7	16
Nonparalytic poliomyelitis	230	53	43	4	6	123	..	13	12	7	46	45	54
Aseptic meningitis	54	7	7	..	..	35	1	3	1	..	14	16	12
Encephalitis	27	2	1	..	1	21	..	..	2	3	7	9	4
Other	6	2	2	..	..	4	..	..	1	1	..	2	..
Total	624	331	266	8	57	207	1	19	22	12	74	79	86
By percent													
Paralytic poliomyelitis	100	87	69	1	16	8	0	1	2	+	2	2	5
Nonparalytic poliomyelitis	100	23	19	2	3	54	0	6	5	3	20	20	23
Aseptic meningitis	100	13	13	0	0	65	2	6	2	0	26	30	22
Encephalitis	100	7	4	0	4	78	0	0	7	11	26	33	15
Other	100	33	33	0	0	67	0	0	17	17	0	33	0
Total	100	53	43	1	9	33	+*	3	4	2	12	13	14

*+=<0.5%.

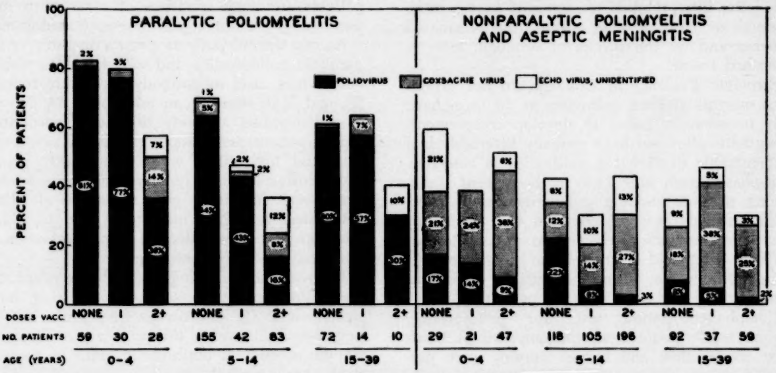
years did not permit a finer breakdown beyond this age. Only 11 of the 1,407 patients in the entire study were aged 40 or over.

Differences in the recovery of poliovirus with respect to age and immunization status were most striking among patients classified as having paralytic poliomyelitis. In this category, in the absence of vaccination, poliovirus was recovered from 81% of the children under 5 years of age, 64% of those 5 to 14, and 60% of those 15 to 39. Thus, apart from the influence of vaccination, poliovirus infection was appreciably more often confirmed in small children with paralytic illness than in older children and adults. In each age group, the recovery of poliovirus was slightly lower from the patients vaccinated with a single dose and markedly lower from those who had received two or more doses, dropping to 36% of cases in the 0-to-4-year age group, 16% in the 5-to-14-year age group, and 30% in the 15-to-39-year age group. There were only 21 patients (not shown separately in figure 1) classified as having paralytic poliomyelitis who had received three or more doses of vaccine; these were mostly in the 5-to-14-year age group. Only one yielded poliovirus.

The lower recovery of polioviruses from vaccinated patients with paralytic illness was attended by a higher recovery of Coxsackie and unidentified ECHO viruses. This was particularly evident in the 0-to-4-year and 5-to-14-year age groups, in which substantial numbers of vaccinated patients were available for study. In these two age groups, "non-polio" enteroviruses were recovered from about 20% of the paralytic patients who had received two or more doses of vaccine. Nevertheless, the percentage of patients whose stools did not yield any virus was appreciably higher among the vaccinated than among the nonvaccinated persons. Together, the combined influence of age and vaccination produced a remarkable range of variation in the laboratory confirmation of poliomyelitis among patients with paralytic illness, from recovery of the virus in 80% of nonvaccinated patients under the age of 5 years to an inability to recover the virus in approximately 70 to 85% in older patients who had received two or more inoculations of vaccine.

In patients with nonparalytic poliomyelitis and aseptic meningitis, in the absence of vaccination, poliovirus was isolated in from 17 to 22% of those under the age of 15 years and 8% of those aged 15 to 39. As in paralytic disease, recovery of poliovirus was consistently lower among immunized patients, falling to 9% among children under 5 years of age and 2 to 3% among older patients who had received two or more doses of vaccine. Coxsackie viruses, present in 12 to 25% of the nonvaccinated persons, were more frequently recovered in the vaccinated patients, exceeding poliovirus isolations by 4 to 10 times. Unidentified viruses were encountered in 9 to 21% of nonvaccinated and in 3 to 13% of vaccinated patients, but no definite pattern of occurrence in relation to vaccination status was evident among patients with nonparalytic illness.

In 121 cases of clinical encephalitis only two isolations of poliovirus were made, both in nonvaccinated patients under 15 years of age. Coxsackie viruses were recovered in 18 to 22% of the patients under age 15 and were about equally distributed in vaccinated (18% in those given one dose and 22% in those given two or more doses) and nonvaccinated patients (22%); unidentified ECHO viruses were recovered from one nonvaccinated patient (3%) and 3 vaccinated (2 or more doses) patients (8%) under age 15. No virus was recovered from the 13 vaccinated patients over age 15.



Recovery of enteroviruses from patients with poliomyelitis or aseptic meningitis, according to age group and doses of vaccine —California, 1955-1957.

Among 73 patients with other illnesses, two isolations of poliovirus and four isolations of Coxsackie virus were made. All but one of these patients had manifestations of a C. N. S. disease not clinically classified as poliomyelitis, aseptic meningitis, or encephalitis. The virus isolations in this group of cases were too few to warrant further analysis.

The markedly less frequent recovery of poliovirus from vaccinated patients given a clinical diagnosis of poliomyelitis, paralytic or nonparalytic, than from nonvaccinated patients, may be interpreted in either of two ways: (1) that the administration of the vaccine reduced excretion of virus or in some other way influenced the recovery of poliovirus from patients whose illness was actually due to poliovirus infection or (2) that the illnesses observed in vaccinated patients were, in fact, less often due to poliovirus infection and more often due to other causes. The latter interpretation is supported by the more frequent recovery of other agents from vaccinated patients and by the results of serologic tests as described below.

Serologic Evidence of Etiology.—In our experience patients yielding poliovirus in the feces have only occasionally failed to develop complement-fixing antibodies and have virtually invariably had demonstrable neutralizing antibodies in convalescent-phase serum samples.[10] In the present study, among patients yielding poliovirus, complement-fixing antibody was present at a titer of 1:4 or greater in over 90% of the serums of convalescent patients; a fourfold or greater rise in complement-fixing antibody titer during the course of illness was demonstrated in about 55% of the patients.

Complement-fixation tests for poliomyelitis, mumps, western equine encephalomyelitis, St. Louis type encephalitis, and herpes simplex were performed on the serums of a group of 663 patients whose stools did not yield an enterovirus. High antibody levels were recorded in the absence of a fourfold rise in antibody titers; high titers were defined as levels of 1:32 or higher against poliovirus or mumps virus antigens and levels of 1:16 or higher against antigens of western equine encephalomyelitis or antigens of St. Louis type encephalitis. High stationary titers (1:64 or greater) to herpes simplex were commonly encountered in patients with antibody rises to other agents; elevated antibody titers to more than one of the other viruses were rarely present. Hence, with respect to herpes simplex virus, only titer rises were considered. Antibody titers below these specified levels to any one of these agents were considered as inconclusive; such antibody levels were often present to more than one agent. The term negative referred to absence of complement-fixing antibody in the lowest dilution of serum tested: 1:4 in the poliomyelitis CF test and 1:8 for all others.

Serologic evidence of poliovirus infection, either a fourfold rise in complement-fixing antibody titer (6%) or an elevated titer (2%) was elicited in only 8% (12 patients) of the 155 patients with clinical paralytic disease whose stools failed to yield a virus. A fourfold titer rise in antibody to the mumps virus was found in 6% of the patients and rises in antibody to St. Louis type encephalitis and herpes simplex viruses in 1% of the cases. Nearly one-half of the paralytic patients had only low stationary titers to one or more agents, and in one-third of the cases all the CF test results were negative. If the results of the poliomyelitis CF test are considered separately, one-third of the patients had "inconclusive" titers of antibody and nearly one-half had no demonstrable antibody. Although infrequent in either group, rises in poliomyelitis antibody titer or elevated titers were found less than one-half as often among vaccinated as among nonvaccinated patients. Serologic evidence of other virus infections was predominantly in the vaccinated group.

Among the 305 patients given a diagnosis of nonparalytic poliomyelitis and who failed to yield an enterovirus, rises in antibody titer were found in 2% and high titers in an additional 2%. No rises in poliomyelitis antibody titer were encountered among patients with aseptic meningitis or encephalitis, and high titers were infrequently present. Inconclusive levels of poliomyelitis antibody, however, were frequently encountered in all clinical categories, a strong indication that such titers were, in general, a reflection of past infection and unrelated to the current illness.

Poliovirus neutralizing antibody determinations were also made on the serums from 340 of the patients whose CF test results were inconclusive or negative. Poliomyelitis infection was evidenced by significant rises in antibody in eight of these patients, approximately 2% of those tested, including one patient with paralytic illness, six with nonparalytic illness, and one with an influenza-like illness. The results of both serologic tests thus strengthen the conclusion that relatively few poliovirus infections had been missed by stool cultures.

Evidence of mumps virus infection was the most frequent positive serologic finding among patients with nonparalytic poliomyelitis, aseptic meningitis, or encephalitis; significant titer rises were seen in about 10% of the cases in each of these clinical categories and elevated titers in an additional 2 to 10% of the cases. Significant titer rises to western equine encephalomyelitis or St. Louis type encephalitis viruses were found in an occasional patient thought to have nonparalytic poliomyelitis and in 5% of the patients with encephalitis. Titer rises indicative of primary infection with herpes simplex virus were present in three cases (1%) of nonparalytic poliomyelitis and two cases of encephalitis. In each clinical category, the percentage of

patients having positive serologic findings was greatly exceeded by the percentage of those in whom all tests were inconclusive or negative.

In summary, the serologic findings added less than 10% to the number of illnesses already confirmed as poliomyelitis by isolation of the virus. Serologic evidence of poliovirus infection in the absence of virus excretion was less frequently elicited in vaccinated patients. Serologic evidence of mumps, St. Louis type encephalitis, western equine encephalomyelitis, or herpes simplex virus infection was encountered primarily in cases of aseptic meningitis and encephalitis, occasionally in paralytic illnesses, particularly in the vaccinated patients.

Concurrent Infection with More Than One Agent.—The battery of laboratory tests used provided an opportunity to assess the frequency of concurrent infection with two or more viruses. The inoculation of stools from about 250 patients into suckling mice offered a selective medium for the emergence of those Coxsackie viruses which do not multiply in tissue cultures, or those which might have been overgrown in such cultures by polioviruses or ECHO viruses if more than one agent were present. Tissue cultures behaving atypically with respect to cytopathogenesis were treated with selected antiserums to detect possible mixtures of two agents. Serologic tests provided opportunity to detect the occurrence of poliovirus infection in patients excreting Coxsackie or ECHO viruses and of mumps virus infection in patients excreting poliomyelitis, Coxsackie, or ECHO viruses.

In 14 patients, two different viruses were recovered from the feces, usually from separate specimens collected on different days. These dual isolations occurred in 1% of 331 patients from whom a poliovirus was isolated, 5% of 216 patients from whom a Coxsackie virus was isolated, and 11% of 97 patients from whom an unidentified ECHO virus was isolated. Unidentified ECHO viruses isolated from patients who also yielded a poliovirus or Coxsackie virus accounted for 11 of the 14 instances in which two viruses were recovered. These unidentified agents were detected more frequently with a Coxsackie virus (nine patients) than with a poliovirus (two patients). Coxsackie virus (B4) and poliovirus (type 1) were isolated from the same person in only one instance; one patient yielded poliovirus types 1 and 2, and another yielded Coxsackie viruses B4 and B5.

Among 185 patients shedding poliovirus and from whom paired serums were tested for complement-fixing antibody to mumps, western equine encephalomyelitis, St. Louis type encephalitis, and herpes simplex viruses, 2 persons (about 1%) showed significant titer rises to mumps; no other titer rises were found. Of 123 patients yielding Coxsackie virus, and having a complete serologic study, a significant rise in poliomyelitis complement-fixing antibody was demonstrated in 3 and a rise in western equine encephalomyelitis antibody in 1, a total of 3% having serologic evidence of a dual infection. Among 45 patients yielding unidentified viruses whose serums were completely tested, a significant rise in poliomyelitis complement-fixing antibody was found in 6 and a rise in mumps antibody in 1, making a total of 16% of this group having evidence of a dual infection. The three cases mentioned above in which a significant rise in mumps antibody was associated with the recovery of an enterovirus (two associated with poliovirus isolations and one with an unidentified enteric virus) were the only instances of multiple infections demonstrated among 53 patients (6%) having a significant rise in mumps antibody.

When the virus isolation and serologic data are combined and extrapolated, they give evidence that, among patients excreting a poliovirus, another virus infection was present in about 2%; of those yielding

TABLE 3.—*Summary of Laboratory Findings in Patients with Acute Central Nervous System Disease, California 1955 to 1957*

Clinical Diagnosis and Vaccination Status	Patients, No.	% of Group									
		Virus Isolated, or Serologic Evidence of Infection							No Virus Isolated		
		Total	Poliomyelitis	Coxsackie	ECHO Unidentified	Mumps	Herpes, Simplex	Mixed Infections	Total	Serologic Test Results Inconclusive	Serologic Test Results Negative	Serologic Tests Not Done
Paralytic poliomyelitis	497	100	57	5	3	3	1	1	30	14	10	7
Nonvaccinated	290	100	70	3	1	0	+	1	25	9	7	10
1 dose	86	100	62	3	1	8	0	0	28	19	7	1
2 or more doses	121	100	24	8	9	5	3	3	48	23	21	4
Nonparalytic poliomyelitis	593	100	11	20	8	6	1	2	52	24	18	10
Nonvaccinated	206	100	17	12	9	5	+	2	55	23	15	17
1 dose	150	100	11	21	6	10	1	1	50	25	19	7
2 or more doses	237	100	6	26	9	5	3	2	49	24	19	6
Aseptic meningitis	120	100	4	28	9	8	2	3	46	24	18	3
Nonvaccinated	38	100	8	29	5	0	0	5	53	29	24	0
Vaccinated	82	100	2	28	11	11	2	2	44	22	16	5
Encephalitis	124	100	5	15	2	12	7	3	56	24	19	12
Nonvaccinated	62	100	6	15	0	13	3	5	58	29	18	11
Vaccinated	62	100	3	15	5	11	11	2	53	19	21	13

a Coxsackie virus, approximately 8% also had evidence of another virus infection. Among patients yielding an unidentified enterovirus, the data are less complete but suggest that about 25% were also infected with another virus.

These findings serve to emphasize the difficulties and chances for error in attempting to ascribe etiological significance to an enterovirus recovered from any particular patient; on the other hand, it is evident from the data as a whole that laboratory evidence of more than one possible etiological agent was infrequently found.

Summary of Laboratory Evidence of Etiology.—The results of virus isolation attempts and serologic examinations are collated and summarized according to the patient's clinical diagnosis in table 3.

The marked decline in confirmed poliovirus infections, from 70% in nonvaccinated to 24% in vaccinated patients with paralytic illness, is again evident. Coxsackie, mumps, herpes simplex, St. Louis type encephalitis, and unidentified ECHO viruses were each associated with some cases of paralytic disease in which evidence of poliovirus infection was lacking. The frequency of these infections, 1 to 5% of the total cases studied, appears to be well within the range of coincidental occurrence; however, a fairly consistent increase in the occurrence of these viruses is discernible among vaccinated patients. Altogether, nonpoliovirus infections were found in 25% of the vaccinated (two-dose) paralytic patients in the absence of any other positive findings. Paralytic illnesses in which poliovirus could not be recovered and in which serologic tests were negative or inconclusive were also much more frequently encountered among the vaccinated patients, comprising over 40% of the two-dose group.

In the other clinical categories of illness, Coxsackie viruses were generally associated more frequently than any other virus with illnesses diagnosed as nonparalytic poliomyelitis, aseptic meningitis, or encephalitis. Mumps and unidentified ECHO viruses were encountered with about equal frequency in nonparalytic poliomyelitis and aseptic meningitis (6 to 9%), but in cases of encephalitis mumps virus was identified more frequently (12%). Western equine encephalomyelitis, St. Louis type encephalitis, or herpes simplex viruses were identified in occasional cases of nonparalytic poliomyelitis and aseptic meningitis (2%) and only slightly more often in cases classified as encephalitis (7%). Since the mumps virus has been the most commonly recognized etiological agent in reported cases of encephalitis in California in recent years (unpublished data), it is of interest that Coxsackie viruses were encountered slightly more often than the mumps virus among the cases of clinical encephalitis in this study.

The less frequent occurrence of poliovirus infections and compensating increase in other viruses among vaccinated patients is also apparent in patients with nonparalytic poliomyelitis or aseptic meningitis. Among the group of encephalitis cases, however, in which a poliovirus could rarely be implicated, there was no evident pattern of difference in the laboratory findings with respect to vaccination.

In about one-half of the cases diagnosed as nonparalytic poliomyelitis, aseptic meningitis, or encephalitis, the combined efforts of stool and serologic examinations failed to reveal the presence of any current virus infection.

Comment

The diversity of viruses found in association with various clinical manifestations of C. N. S. disease points up the dilemma confronting alike the clinician, the virologist, and the epidemiologist, in attempting to determine causal relationships. The viruses detected in this study may each be widely distributed in the population at times, producing inapparent infections and minor illnesses, and to a variable extent are capable of invading the C. N. S. and giving rise to an overlapping spectrum of clinical syndromes.

The finding of Coxsackie or other nonpolioviruses in association with 5% or less of the paretic illnesses in nonvaccinated patients does not, in itself, indicate whether or not infection with these agents was merely coincidentally present or was the cause of illness. In view of the several well-documented reports [4] of paralytic disease in which enteroviruses other than poliovirus have been implicated as etiological agents, it appears reasonable to believe that the nonpolioviruses encountered among paralytic patients in the present study were the probable cause of illness in at least some instances. By separation of the cases regarded clinically as paralytic poliomyelitis into categories according to the doses of vaccine received, various illnesses which might be mistaken for poliomyelitis were, in effect, concentrated in the immunized group of patients. Hence, the marked increase in the association of nonpolioviruses with paralytic illness among the vaccinated patients, correlating with the number of doses of vaccine received, indirectly provides further substantiation of the etiological significance of these agents. These observations support recent predictions by Steigman [4a] and by Dalldorf [11] that widespread vaccination would make paralysis due to other viruses more conspicuous.

The clinical characteristics of the paralytic illnesses observed in this study which appeared to be attributable to nonpolioviruses will be described elsewhere. It should be noted, however, that the muscle paresis in illnesses associated with Coxsackie, unidentified ECHO virus, or mumps virus infection was almost uniformly graded as of slight or moderate severity. This was often, but less uniformly, true of the muscle gradings in patients in

whom the laboratory evidence of poliovirus infection was negative, and no other agent was implicated. Cases clinically regarded as paralytic poliomyelitis in which supporting laboratory evidence of poliovirus infection was lacking have previously been noted by us [10] and by others.[12]

It is of interest that apart from vaccination status, the proportion of paralytic illnesses for which no etiological agent could be established became somewhat higher with increasing age.

Nonparalytic illness in patients who had received vaccine was also consistently less often related to poliovirus infection and more often associated with other viruses than in nonvaccinated patients. It appears evident that vaccination provided significant protection against all clinical types of C. N. S. disease due to poliovirus, including nonparalytic as well as paralytic illness. These findings confirm, and extend, those of Davis and Melnick.[1b]

The importance of Coxsackie viruses, ECHO viruses, and the mumps virus as causative agents of the nonparalytic poliomyelitis or aseptic meningitis syndrome requires little comment. In this study, clinical diagnoses of aseptic meningitis and nonparalytic poliomyelitis, as rendered by the attending physician, were examined separately, since, with few exceptions, the cases classified as nonparalytic poliomyelitis were entered in the official morbidity records of the local and state health departments as cases of poliomyelitis. In each of the three years of this study, poliovirus was recovered in less than one-fourth of the cases of "nonparalytic poliomyelitis" and the number of poliovirus isolations was exceeded by the number of Coxsackie virus isolations in two of the three years. This is striking evidence of the range of error in poliomyelitis morbidity statistics in recent years in California and other states in which nonparalytic cases, comprising some 30 to 50% of the reported cases, are included in the poliomyelitis incidence figures.

The finding that Coxsackie viruses were associated with illnesses clinically diagnosed as encephalitis more frequently than were mumps, herpes, or the arthropod-borne encephalitis viruses strongly suggests that Coxsackie viruses were the causative agent in some of these illnesses. Clinical histories, however, indicate that there was little to distinguish some of these illnesses from an aseptic meningitis syndrome other than slight drowsiness or lethargy. In other cases, convulsions and evident changes in sensorium were recorded. These observations add to previous reports [13] of association of Coxsackie and orphan viruses with encephalitic illness.

Viewed as a whole, the findings presented herein coupled with those of other investigators suggest that the viruses of the Coxsackie and ECHO group, like poliovirus and, to a lesser extent, the mumps virus, should be recognized as having protean pathogenic capabilities enabling them to give rise to a broad spectrum of syndromes of the central nervous system, embracing the clinical picture of aseptic meningitis, mild to moderate paralytic poliomyelitis, meningoencephalitis, and encephalomyelitis.

Several reasons may be advanced to account for the high proportion of cases of acute C. N. S. disease for which an etiology was not determined by the present study: 1. The laboratory procedures sometimes failed to detect infections for which examinations were made. 2. Illness was due to known infectious agents for which tests were not made. 3. Illness was often due to etiological factors, infectious and/or noninfectious, which are not yet recognized. In our opinion, it is probable that the first two reasons were contributory but that other etiological factors must still be sought to account for the high proportion of acute illnesses of the central nervous system which elude definitive laboratory diagnosis.

Summary

Viral laboratory studies were carried out in a series of 1,407 patients admitted to hospitals in California with suspected viral disease of the central nervous system during 1955, 1956, and 1957. Among patients given a clinical diagnosis of paralytic poliomyelitis who had not received poliomyelitis vaccine (Salk type), poliovirus was recovered more frequently (81%) from those under 5 years of age than from those in older age groups (60 to 64%). In each age group, the recovery of poliovirus was markedly lower among vaccinated patients, being successful only one-half to one-third as often among those who had received two or more doses of vaccine as among those who had received no vaccine or only one dose.

The results of virus isolation attempts were supported by complement-fixation tests, which only occasionally revealed a significant rise in antibody titer in patients whose stools failed to yield a poliovirus. Laboratory evidence of other viral infections associated with cases of clinical paralytic poliomyelitis included Coxsackie viruses, group B (types 2 to 5) and group A (type 9); ECHO viruses; mumps virus; and epidemic (St. Louis type) encephalitis and herpes simplex viruses. These agents were found much oftener in vaccinated patients, with a frequency equal to that of proved poliovirus infections among the two-dose vaccinees. The muscle paresis associated with nonpoliovirus infection was almost uniformly of mild to moderate severity.

Among illnesses clinically classified as nonparalytic poliomyelitis or aseptic meningitis, poliovirus infection was demonstrated in less than one-fifth of the nonvaccinated patients and was consistently less often established in those who had received the vaccine. The same array of nonpolioviruses was

encountered, the most frequent of which were the Coxsackie group B viruses. No etiological agent was established in about one-half of the cases.

In cases clinically classified as encephalitis, no single agent was found in more than 15% of the group and no virus could be implicated in slightly more than one-half of the cases. Coxsackie viruses and the mumps virus were somewhat more frequently identified than were the other agents, viz., the western equine encephalomyelitis, St. Louis type encephalitis, herpes simplex, poliomyelitis, and unidentified ECHO viruses. In each clinical category, 1 to 3% of the patients had evidence of concurrent infection with two viral agents.

These data provide additional evidence of the protective effect of inactivated poliovirus vaccine against both paralytic and nonparalytic illness due to poliovirus infection. They also illustrate how the suppression of poliomyelitis by widespread vaccination makes more conspicuous the occurrence of paralytic poliomyelitis-like illnesses due to other causes.

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TOXICITY OF FERROUS SULFATE.—It is now clearly evident that the accidental ingestion of over-dosages of therapeutic iron preparations may be fatal to children. As little as one gram of ferrous sulfate is now considered to be a potentially fatal dose. The data . . . indicate that the toxicity of iron may be more closely related to the systemic effects induced by absorbed iron than to localized traumatic effects of the iron upon gastrointestinal tissues. In experimental animals toxicity and death appear to be directly associated with the serum iron rises during the first few hours subsequent to the oral administration of iron in aqueous solution. —H. Albert, C. R. Kemp, and W. G. Rohse, American Physiological Society Proceedings, Fall Meeting—Sept. 8-11, 1959, *The Physiologist*, August, 1959.

CHOICE OF ANESTHETIC TECHNIQUE IN COMPLICATIONS OF PREGNANCY AND LABOR

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There are no pat formulas for anesthesia in obstetrics. The anesthesiologist must understand not only the possible complications of pregnancy and labor but also the manner in which the individual obstetrician intends to deal with such complications as may arise. Classification and review of the complications inherent in the products of conception, maternal complications, and complications of delivery show how important it is to be discriminating in choosing between general and regional anesthesia, in deciding on the level of general anesthesia, and in using relaxants. Experience has led to the recognition of certain basic situations for which rational methods of anesthetic management have been developed, and the tendency to settle down to routines of single anesthetic methods to the exclusion of all others should be resisted.

When anesthesia first came into use there was only ether, and the choice was simple; for, as Liston asserted, "This Yankee dodge beats mesmerism hollow." Today, 112 years after Sir James Simpson administered the first obstetric anesthesia on Jan. 19, 1847, the decision has become immeasurably more difficult. The entire gamut of anesthetic agents and techniques has been employed in a vain search for the ideal obstetric anesthetic procedure which would be suitable for all patients under all circumstances. It now seems clear that there is no such ideal. The search, however, has produced many champions of individual drugs and many advocates of specific methods. There is, at present, a growing tendency among certain obstetricians, anesthesiologists, and even whole lying-in clinics to employ and extol, to the exclusion of all others, a single anesthetic agent or technique for use in obstetrics. Indeed, the words "routine" and "always" are becoming almost the hallmark of the literature on obstetric analgesia and anesthesia.

The administration of obstetric anesthesia is hazardous at best, for there are two patients to be considered and two lives to be sustained. When either pregnancy or labor is complicated or in any way abnormal, the hazards are increased. Certain of these complications of pregnancy and labor constitute definite indications for one type of anesthetic procedure and definite contraindications to the employment of others. The use of the wrong agent or technique in such an instance, however well-conducted the anesthesia may be, must surely represent a barren triumph of technique over reason. The anesthesiologist not only must be aware of the nature of these complications of pregnancy and labor but also must understand the manner in which the individual obstetrician with whom he is associating intends to deal with such complications. Furthermore, consideration must also be given to the effect of anesthesia on the pathological process involved as well as on the operative procedure that is contemplated.

It would be at least equal sophistry to suggest that there exist pat formulas or rules of thumb designed to cover all the various obstetric situations and exigencies. Obviously there are not. There are, however, certain basic situations for which rational methods of anesthetic management have been evolved on a sound, physiological basis.

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Complications Inherent in the Products of Conception

Extrauterine pregnancy occurs about once in every 300 gravid women. The danger of hemorrhage, shock, and collapse, as the chorionic villi burrow their way into blood vessels and through the tubal wall, requires a mode of anesthesia designed to protect the patient in the event of such an accident. For this reason, the patient's compensatory cardiovascular reflexes must not be transgressed, and such anesthetic methods as spinal and caudal, which accomplish sympathetic blockade and thus rob the body of much of its ability to produce compensatory vasoconstriction, must be avoided. Very light general anesthesia is indicated in these instances, with the addition of muscle relaxants to the basic inhalation techniques, when muscle relaxation becomes necessary. Obviously, these patients are candidates for emergency operative intervention, and the problem of the full stomach introduces itself. When both anticipated hemorrhage and a full stomach confront the anesthesiologist, the only safe anesthetic management would appear to be the introduction of a cuffed endotracheal tube, with the patient awake and in control of her laryngeal reflexes, followed by light general

anesthesia, preferably induced with cyclopropane. Muscle relaxant drugs may then be added as necessary.[1]

Two other complications involving the products of conception, namely, placenta previa and premature separation of the placenta, can lead to hemorrhage, shock, and death. Danger to the fetus is especially high when its circulation is compromised by separation of the placenta. The incidence of placenta previa is about one in 500 cases and of premature separation about one in 300 cases. For reasons already noted spinal, caudal, and epidural anesthesias must be avoided. At the same time the hypoxic fetus should not be subjected to the depressant effects of strong general anesthetic agents. Pudendal block or very light general anesthesia are the best choices for relief of pain during vaginal delivery. If cesarean section is elected because of massive hemorrhage before labor has progressed far enough for vaginal delivery, light general anesthesia supplemented by a muscle relaxant is the logical technique. It should be unnecessary, although perhaps wise, to add that high concentrations of oxygen are always indicated in obstetric anesthesia and particularly in all instances of hemorrhage in which a high partial pressure of oxygen may compensate to some extent for the lowered oxygen-carrying capacity of the blood.

Premature labor, on the other hand, requires a different anesthetic approach. Prematurity of the fetus has a hospital incidence of 3.2%, and therefore is one of the most common complications of the pregnant patient who receives anesthesia. All else being equal, the anesthetic management must be devised to avoid depression of the fetus. Clifford [1A] has pointed out that the premature infant is easily narcotized with either medicaments or general anesthetic agents and that the two in combination are frequently lethal. It is essential that medication be restricted to the minimum compatible with the maternal pain threshold and that some form of regional anesthesia be chosen: local infiltration, direct nerve block, caudal, epidural, or spinal analgesia. All these, when properly conducted, should spare the premature infant from further depression and are much preferable to the general anesthetic agents, with their ability to produce transplacental narcosis.

Maternal Complications

Without the shadow of a doubt, the most common and important maternal complication from the viewpoint of the anesthesiologist is that of a full stomach at the time of delivery. Since obstetric anesthesia is emergency anesthesia, insofar as the patient is unprepared, obstetric patients frequently come to delivery with a full, or partially full, stomach. Furthermore, it is well established that the gastric emptying time is much prolonged by both labor and the sedative drugs often employed during labor, so that the stomach may still contain food ingested 8, 12, or even 16 hours prior to delivery.[2] The incidence of frank emesis of these stomach contents has run as high as 40% in some series of obstetric anesthesias,[2] and even in the absence of active vomiting a silent regurgitation of gastric juice may occur and produce a form of bronchopneumonia.[3] It is clearly the duty of the anesthesiologist to protect the patient who comes to delivery with a full stomach, and some form of regional anesthetic technique is mandatory. Merrill and Hingson [4] believe that either locally or caudally induced analgesia are the choices, since they have reported vomiting and aspiration of vomitus even with spinal anesthesia. However, few others would dispute that spinal anesthesia, if not the preferred method, is at least many times better than general anesthesia in any form. The aspiration of vomitus is now a leading cause of obstetric deaths related to anesthesia,[5] the incidence of aspiration itself being 0.15% in one hospital series of 44,016 pregnancies [6] and accounting for 51% of 59 maternal deaths in another investigation.[4] It is obviously the obligation of all physicians to protect their patients from this thoroughly preventable tragedy. Therefore, when general anesthesia is absolutely indicated in the patient with a full stomach, it is mandatory to insert a cuffed endotracheal tube while the patient is awake and in control of her laryngeal reflexes prior to inducing the general anesthesia.

The toxemias of pregnancy, preeclampsia and eclampsia itself, apparently have the same underlying, although as yet unknown, pathogenesis; but they present different problems from the point of view of anesthesia. Preeclampsia has an incidence of about once in every 20 deliveries, while true eclampsia occurs about once in every 500 pregnancies, in lying-in practice. The milder toxemias, or preeclampsias, present evidence of metabolic upset and parenchymal damage, and anesthetic agents which are known to produce further profound metabolic upset, such as ether, chloroform, vinyl ether (Vinethene), ethyl chloride, and even trichlorethylene, should be avoided. Here is an indication for those regional procedures such as spinal and caudal analgesia, which not only leave the body metabolism relatively unaffected but further produce some degree of sympathetic blockade. When true eclampsia occurs, with convulsions and coma in addition to the parenchymal damage already referred to, the indication is again for some form of regional anesthesia, often merely local infiltration, with intravenous administration of thiopental (Pentothal) sodium as needed to control the convulsions.[7]

Serious heart disease during pregnancy occurs in approximately 2% of clinic patients but ranks high on the list of causes of maternal death. Heart disease of even the mildest type is a distinct hazard when complicated by pregnancy, and the care of such

patients, particularly the choice of analgesia and anesthesia, deserves detailed consideration. The danger of decompensation is very real and increases in proportion to the strain placed on the myocardium by the burdens of labor and delivery. The aim must therefore be to prevent all such strain, either physical or emotional, and to shorten the second stage of labor as much as possible. In this regard, the use of continuous caudal or spinal anesthesia throughout labor and delivery has proved to be an excellent solution to the entire problem. There are those patients, however, on whom regional procedures must not be forced, since they are capable of doing more harm than good by virtue of the emotional strain produced; for such patients good sedation throughout the first stage of labor, and the use of a terminal regional procedure or perhaps light general anesthesia, must be the choice.[8] In the face of frank decompensation a regional procedure must be employed, and under such circumstances spinal anesthesia has the great advantage of producing a bloodless phlebotomy and thus becomes the indicated anesthetic procedure.[9]

Until the advent of insulin diabetic women were usually sterile, so that this disease was an infrequent complication of pregnancy. Today, the incidence of diabetes is still not high, being only 0.174% in one series of 31,544 deliveries [10]; but the problems it presents from the anesthetic point of view are important, inasmuch as there is a marked increase in the incidence of both hydramnios and toxemia in the pregnant diabetic, and the stillbirth and neonatal death rates are appreciably increased. The preferred anesthesia is therefore some form of conduction anesthesia, either caudal, epidural, or spinal. This approach will serve to protect the infant from the hazards of systemic narcosis, while at the same time it will not alter the functional activity of the maternal pancreas, thus permitting more adequate control of the problems of both maternal and infant acidosis.

Finally, there are two types of pregnant women who demand special classification as far as anesthetic treatment is concerned. The first is the elderly primipara. In such a patient, the increased value of the fetus to the parents, together with the increased frequency of dystocia, requires that the case be treated as is prematurity. Heavy premedication and deep general anesthesia should be avoided and preference should be given to caudal, epidural, or spinal anesthesia or some other type of regional procedure. If general anesthesia must be used, the plane of anesthesia should be kept as light as is compatible with the exigencies of delivery.

The other problem mother is the "dangerous multipara," or the "grande multipara." Such women are apt to have excessively succulent tissues, and the danger of hemorrhage from even small tears and lacerations is great. For this reason such techniques as spinal or caudal induction of anesthesia, which produce sympathetic blockade and hence the loss of the compensatory cardiovascular reflexes, are best avoided if possible. However, it must also be remembered that the incidence of asphyxia neonatorum increases after the eighth delivery, so that, again, general anesthesia, if employed, should be kept at a light level. Perhaps the most enlightened choice of anesthesia in such instances would be local infiltration, with a vasoconstrictor substance added to the local anesthetic solution.

Complications of Delivery

Certain abnormalities of position and presentation of the fetus also complicate labor, and therefore delivery, and demand special attention to the anesthetic requirements for delivery. Breech presentation, for instance, occurs in about 4% of all pregnancies, and the three varieties of breech presentation offer differing anesthetic problems. In the case of a full or a frank breech presentation, intrauterine manipulation necessitates the use of deep ether, chloroform, or vinyl ether anesthesia to provide uterine muscle relaxation, which cannot be facilitated and may even be decreased by the use of regional anesthetic procedures, such as spinal or caudal, which produce sympathetic blockade and therefore parasympathetic predominance. In a footling presentation per se, on the other hand, or when either a full or frank breech has been converted to a footling presentation by intrauterine manipulation, the problem is different: the need is for perineal relaxation and minimal further trauma to the fetus in the way of depressant drugs. Therefore, in a footling presentation per se, spinal, caudal, epidural, or light general anesthesia, with a supplementary muscle relaxant agent for perineal relaxation, all serve adequately; in the converted frank or full breech presentation, the general anesthesia may be greatly lightened for actual extraction and a muscle relaxant employed for further perineal relaxation.

Occipitoposterior positioning occurs in about 20% of vertex presentations, but the incidence of its persistence during labor, which demands particular anesthetic management, is considerably less frequent. Persistent occipitoposterior positioning presents a situation that exemplifies well the fact that the anesthetist not only must be aware of the nature of the existing complication of pregnancy or labor but also must understand the manner in which the individual obstetrician with whom he is associating intends to treat such complications. Many obstetricians, when faced with a persistent occipitoposterior position, will elect to perform a Scanzoni maneuver if the head is on the perineum but will do a manual rotation if the vertex remains higher in the birth canal. A Scanzoni maneuver will require the perineal relaxation afforded by spinal, caudal, or general anesthesia supplemented with a muscle

relaxant drug; on the other hand, manual rotation frequently demands that uterine muscle relaxation be obtained, and deep anesthesia with use of ether, chloroform, or vinyl ether may well be necessary.

Transverse arrest presents a somewhat similar problem. Additional fetal trauma in the form of deep anesthesia must be avoided, yet the danger of tears requires that the maternal soft tissues and perineal muscles be well relaxed. For these reasons, spinal or caudal analgesia provide a solution, which can also be provided by the use of light general anesthesia, with the additional administration of a muscle relaxant agent.

Brow and face presentations are relatively rare, occurring in 0.17 and 0.38%, respectively, of labors. The problem is, again, to secure sufficient perineal relaxation for operative delivery from below, without subjecting the fetus to further depression, and so deep general anesthesia should be avoided. Once again, spinal or caudal analgesia, or light general anesthesia with the additional use of a muscle relaxant, will serve the purpose well.

Summary

The high incidence of complications during pregnancy, labor, and delivery demands special anesthetic management for each complication. When hemorrhage and shock are encountered light general anesthesia is indicated, with supplemental muscle relaxation when necessary. Fetal immaturity and maternal metabolic diseases are usually indications for the use of a regional anesthetic. Abnormal fetal presentations may require deep general anesthesia for uterine relaxation or either spinal blockade or general anesthesia supplemented by muscle relaxants for perineal relaxation. The dangers of vomiting and aspiration of vomitus must always affect the choice and management of general anesthesia for obstetric procedures.

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THE LENS IN DIABETES.—A sudden alteration in the volume of the lens is a frequent finding among diabetics, and this necessarily causes a change in refraction, which may be very transient, but is sometimes very dramatic. The lens capsule is semipermeable, so in the acute stage of diabetes the fluid content of the lens promptly increases, and myopia ensues; but as soon as diet or insulin have controlled the hyperglycemia, the process is reversed, the lens shrinks, the myopia is shed, and several degrees of hypermetropia may even result. The unstable diabetic will thus have an equally unstable focal range, and such patients must be sight-tested only at periods of a balanced blood-sugar, or the spectacles will be far from correct. . . . The true Diabetic Cataract occurs only in youth, generally between the age of 15 and 25, but exceptionally in infancy; and it is remarkable for its rapidity, the whole lens becoming opaque within a few weeks in adolescence, or within a few days in children. Its development is roughly proportional to the severity of the diabetes. . . . A simple senile cataract arises in the elderly diabetic with slightly greater frequency than in the population at large. Such lens opacities often start beneath the posterior capsule, with a brassy iridescence reminiscent of the more brilliant "polychromatic lustre" in "complicated" cataracts (i.e. secondary to a uveitis) which similarly start beneath the posterior capsule.—P. D. Trevor-Roper, M.A., M.B., B. Chir., The Ocular Complications of Diabetes, *The Postgraduate Medical Journal*, May, 1959.

EFFECT OF POLLUTED LOS ANGELES AIR (SMOG) ON LUNG VOLUME MEASUREMENTS

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The breathing of smog has direct effects on the respiratory tract in addition to direct effects on the eyes and indirect statistical effects on total mortality. The direct respiratory effects were studied in 66 volunteers, 46 of whom had pulmonary emphysema. Measurements were obtained of total vital capacity, timed vital capacity, maximal breathing capacity, residual air, and rate of nitrogen-washout during oxygen breathing. These were used as criteria for the improvement noted when subjects, after breathing either smoggy air or clear Los Angeles air, were allowed to breathe air filtered through activated carbon. The most significant improvement found was the decrease in the volume of residual air noted when subjects with emphysema breathed filtered air for not less than 40 hours. The severity of emphysema was aggravated by smog. No significant changes in lung volume measurements were demonstrated from the breathing of filtered air as compared to smoggy air by essentially normal subjects.

The health effects of air pollution are of great interest throughout the world at present. Although the eye-irritating effect of smog is often obvious in the Los Angeles area, the presence of a significant deleterious effect on breathing has not been so generally recognized. A number of clinicians in the Los Angeles area have attributed to air pollution increasing severity of symptoms in persons with chronic pulmonary disease such as emphysema and asthma or in other chronically ill patients. These opinions are based largely on the subjective symptoms of patients in relation to the air breathed and to atmospheric conditions. Elderly persons with chronic pulmonary and cardiac disability appear to suffer the most severe effects. Acute illness of an epidemic proportion has occurred from air pollution in the past, as in the Meuse Valley in Belgium in 1930,[1] in Donora, Pa., in 1948,[2] and in London in 1952 and 1956.[3] Persons with chronic pulmonary disease were the most severely affected, and many died, although the normal population also suffered from eye irritation, coughing, wheezing, chest pains, nausea, and vomiting.

The composition of smog in Los Angeles is different in certain respects from that found in other parts of the United States such as St. Louis, Pittsburgh, or New York. There is an absence of coal smoke in Los Angeles, and the location of the city in an area hemmed in by mountains on three sides with the sea on the fourth results in less breeze and permits inversions of the atmosphere with the occurrence of smog. The operation of 3 million automobiles is the major source of smog[4] in Los Angeles. The automobile exhaust contains carbon monoxide, hydrocarbons (organic vapors), olefins, oxides of nitrogen, aldehydes, oxides of sulfur, and particulate matter. Smog results from chemical reactions among the pollutants. Hydrocarbons are oxidized in the presence of sunlight, with nitrogen dioxide acting as a catalyst, and ozone is formed. Aerosols result from particles of solids or liquids becoming highly dispersed, and these scatter light waves, reducing visibility. Adsorption of oxidants to aerosols may intensify the irritant effects of smog. Industrial pollution consists primarily of organic solvent emissions and residues from fuel-oil burning, such as oxides of nitrogen, carbon monoxide, sulfur oxides, and particulate matter.

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The chemical composition of the air pollutants is complex, including many unstable chemical compounds, especially in the presence of sunlight.

Smog alerts are called by the Los Angeles Air Pollution Control District (LA-APCD) on the basis of the attainment of designated levels of four constituents of smog; namely, ozone, oxides of nitrogen, sulfur dioxide, and carbon monoxide. Thus far, alerts have been called only for ozone, and most of these have been of relatively short duration, some for only a few minutes. The high concentration is often present at only one of the sampling stations in the Los Angeles area (a first-stage alert is called when the ozone level reaches 0.5 ppm).

The major health problem at present relates to the effects of the pollutants in the atmosphere at lower concentrations than the alert level and for prolonged periods of time. Other constituents of smog may be more harmful than the four pollutants used as criteria for calling alerts. Haagen-Smit[5] reports that chromatographic and spectrographic

analysis of Los Angeles smog revealed the presence of many aldehydes and organic acids and of a multitude of hydrocarbons. The composition of smog changes from hour to hour at any given location. The use of synthetic smog mixtures in studying the effects on man presents many problems. Reproduction of the same response as the naturally occurring air pollution in this area would require maintenance of the same composition of pollutants, variations of concentration in the environment, time of exposure, and photosynthesis. Kotin and Falk [6] report that an artificial smog made by reacting gasoline and ozone in realistic oxidant concentrations produces no demonstrable physiological or morphologic changes in presumably healthy animal species. Even with oxidant concentrations of 30 times the average concentration on a smoggy day, the physiological changes are all of a low order of magnitude and rapidly disappear after removal of the animal from exposure. Studies on a limited number of healthy human volunteers revealed no significant physiological change after acute short exposure to realistic oxidant concentrations of a synthetic smog made from gasoline and ozone.

TABLE 1.—*Number of Patients in Three Exposure Groups, by Condition*

Condition	Exposure Group*		
	Short (2-4 Hr.)	Moderate (18-20 Hr.)	Prolonged (40-90 Hr.)
Pulmonary emphysema	15	13	18
Bronchiectasis	1	1	2
Bronchial asthma	1	2	1
Chronic bronchitis	1	1	0
Pneumoconiosis	1	1	0
Postpneumonectomy	1	1	0
Cystic disease of the lung	0	0	1
Sarcoidosis	0	1	0
Exposure to chemical fire	0	0	1
Cardiac disease	0	0	1
Normal	1	0	1
Total	21	20	25

* Short-exposure group: age range 19 to 66 yr., room temperature 22 to 28 C (av. 24); moderate-exposure: age 50 to 70 yr., temperature 21 to 28 C (av. 23); prolonged-exposure: age 36 to 71 yr., temperature 20 to 28 C (av. 24.5).

As a result of proposals to change the "first alert" level to a higher value than 0.5 ppm of ozone, tests were made in which a volunteer was exposed to about 2 ppm of ozone in an outside chamber. A significant impairment in respiration, as shown in the spirogram measurements [7] (especially the timed vital capacity for three seconds and the shape of the exhalation curve), resulted from this short-term exposure to the high concentration of ozone. The alert level for ozone was not raised, and there has been no further discussion on this aspect after this one test.

The primary purpose of the present study was to obtain objective quantitative lung volume measurements on human subjects, particularly those with pulmonary insufficiency, while they were breathing air during the smoggy periods that naturally occur in Los Angeles and then to compare the changes in pulmonary function which might be induced by breathing air which had been filtered to remove smog. The question we sought to answer was whether the breathing of smoggy air produces a significant deleterious effect which can be measured by pulmonary function tests.

Procedures

These studies have been carried out over the past three and one-half years. The number of studies which could be performed with this procedure was limited because of the problem of availability of suitable subjects for study during smoggy periods and during an additional two-or-three-day stay in the filtered-air room in the hospital. Residence in this room was somewhat monotonous for many of the subjects. All studies were carried out at the University of Southern California cardiorespiratory laboratory, located on the second floor of the Hospital of the Good Samaritan near the downtown section of Los Angeles. Smog, when present in the Los Angeles basin, is quite prevalent in the hospital area. The central monitoring station of the LA-APCD is in this general area, so that the approximate readings for ozone, oxides of nitrogen, sulfur dioxide, and carbon monoxide can be obtained daily. The intensity of smog varies in different parts of the Los Angeles basin from day to day, and the area of the laboratory represents an average, having a concentration less severe than some but more severe than other locations.

The filtered air was obtained with use of activated carbon filters (Pure Air Type, model A-5, 42 lb. of carbon per filter and 500 cu. ft. of air flow per minute). It has been shown that air filtered over activated carbon protects plants [8] in greenhouses, and plants are very sensitive to even low concentrations of smog. Lung function measurements were obtained and compared while subjects were breathing both the smoggy air and the filtered air at the same study period. (The subjects were kept for from 2 hours to as long as 90 hours in the filtered-air room.) Each person was used as his or her own control. This procedure enhanced the validity of attributing the changes in pulmonary function measurements to air pollution rather than to some other factor. Periodic variations in lung function measurements do occur in the absence of air pollution in patients with severe chronic pulmonary disease, such as emphysema, especially during respiratory infections. Every attempt was made to make the only variable in the study the atmosphere which the subject breathed. The room temperature ranged from 20 to 28 C, and in a similar degree for the three groups studied (table 1).

Air was classified as smoggy when there was a definite odor of ozone, reduced visibility, eye irritation, and the prediction of smog by the LA-APCD, including reports of the pollutants from the monitoring stations. The general procedure was to

obtain subjects for study after they had been exposed to smoggy periods of at least three to four days' duration and to obtain the initial lung volume measurements. The subjects studied and the data reported for clear air in Los Angeles represent a period of more than three days of no smog forecast by the LA-APCD, no odor of ozone, no evidence of eye irritation, and good visibility.

The maximum concentration of the various air pollutants reported as being present between 9 a. m. and 2 p. m. by the LA-APCD downtown station during the days of the studies is given below. Concentrations of total oxidants ranged from 0.2 to 0.7 ppm, with ozone from 0.20 to 0.53 ppm, oxide of nitrogen from 0.2 to 0.6 ppm, sulfur dioxide from 0.05 to 0.25 ppm, and carbon monoxide from 5 to 27 ppm. The absence of the eye-irritating property of smog and of the odor of ozone has been consistently noted by subjects while breathing filtered air, even for a few minutes. The odor of ozone was often quite apparent when one left the filtered-air room, even on some days when the LA-APCD reported no significant smog and permitted incinerator burning, before the latter practice was banned in this city. These studies have not been correlated with concentrations of individual constituents of air pollution but rather with the presence or absence of smog.

Three major time intervals in the filtered-air room were used: (1) a short duration of 2 to 4 hours, (2) a moderate duration of 18 to 20 hours, and (3) a prolonged duration with a minimum time of 40 hours and a maximum of 90 hours (average, 55 hours). The short runs of two to four hours were compared on the same day, with the subject first breathing the smoggy air and then filtered air, or breathing clear Los Angeles air then filtered air. All of the other subjects, who were kept in the filtered air for moderate or prolonged periods, were admitted to the hospital and after the initial study were kept continuously in the room with the activated carbon filter.

Material for Study

All of the subjects studied were volunteers, and they were willing to reside in the filtered-air room for varying lengths of time, including the time necessary for repeat measurements of lung volume. The subjects included 16 women and 50 men (ages 19 to 71 years), and 46 of the 66 had pulmonary emphysema (table 1). Subjects with severe emphysema were sought because of their diminished breathing reserve and a greater likelihood that changes induced by breathing the smog air would be detectable. Most of the subjects did not desire or would not volunteer to have a repeat arterial puncture within one to two days after having an initial puncture and did not want to swallow the esophageal balloon for the compliance measurements.

Fatigue was one of the difficulties complained of on the short run of two to four hours' duration, especially in the patients with severe emphysema, since all of the tests were performed on the same day. Close checks were required for the residual air measurements, and several measurements were frequently necessary to obtain the accuracy desired. Satisfactory measurements were obtained in all subjects at both study periods, and, so far as is known, the air breathed was the only variable.

Measurements

Measurements were obtained of total vital capacity, timed vital capacity for three seconds, and maximal breathing capacity on the 13½-liter Collins respirometer.[9] The spirogram tracing was recorded with the fast speed so that the shape of the exhalation curve, the exhalation time, and evidence of air trapping, when present, could be noted. Bronchospasm was evaluated by measuring changes in the maximal breathing capacity after the administration of a bronchodilator treatment with either isoproterenol (Isuprel) or racemic epinephrine (Vaponefrin).

The amount of residual air was measured by both the oxygen open-circuit and the improved helium closed-circuit [10] methods and was checked routinely by repeat measurements for values not to exceed 100 ml., or, in the subjects with severe emphysema, the residual percentage of total lung capacity not to exceed 2%. Measurement of expiratory reserve was obtained at the time of each residual air measurement, as this permitted determination of the precise level of the diaphragm at the time and improved the accuracy of the residual air measurement.[10] The volume of the residual air as observed in chronic lung disease varies widely from less than 40% of the normal predicted in pulmonary fibrosis to over 400% in pulmonary emphysema.

The ventilation factor [11] was used to evaluate the ability to use the chest and lungs as a bellows. This value was obtained from the average of the timed vital capacity for three seconds, the maximal breathing capacity, and the residual percentage of total lung capacity, all expressed on a basis of 100% of the normal predicted. All of the lung volume measurements were expressed at body temperature and at ambient and saturated barometric pressure. All of the residual air measurements were obtained with the patient in the fasting state and lying supine.

Air distribution in the lungs was studied by means of the nitrogen meter, with continuous recordings of each breath during oxygen breathing. The oxygen breathing was continued until an end tidal nitrogen concentration of 1% was reached, unless more than 15 minutes was required. Extensive studies have been performed to evaluate the nitrogen washout test with the nitrogen meter.[12]

The nitrogen washout curve is quite reproducible and provides significant information for evaluating pulmonary function impairment. However, the method of using a single deep breath of oxygen with the nitrogen meter was found unsatisfactory for quantitative comparisons in this study. The single-breath nitrogen curve was not consistently reproducible in the same subject, and other studies indicated that this test reflected primarily the better ventilated alveoli.[13] The alveolar nitrogen content after seven minutes of oxygen breathing also provided additional information on the uniformity of air distribution in the lung.

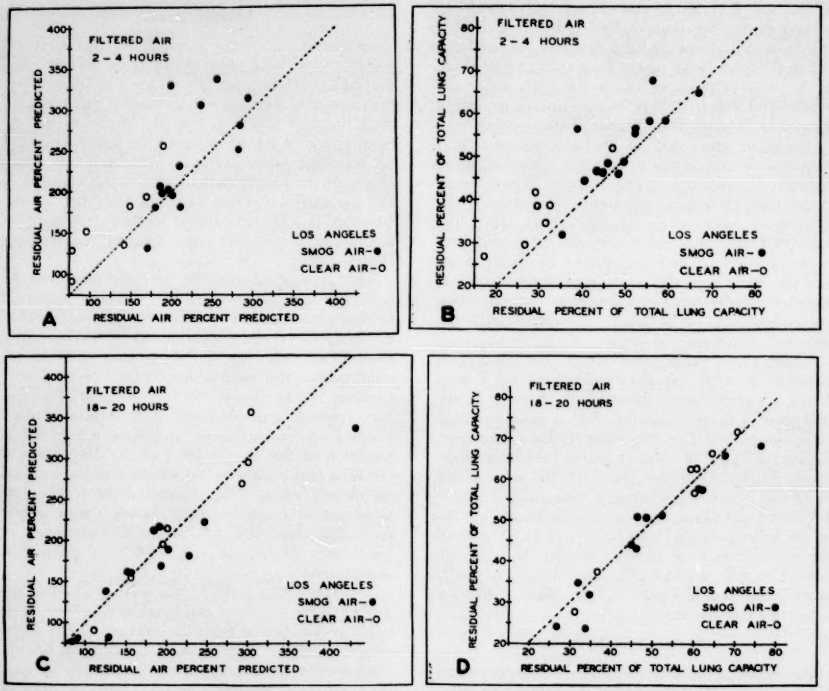

Fig. 1.—Comparison of volume of residual air as percentage of normal predicted and volume of residual air as percentage of total lung capacity in subjects breathing filtered air (ordinates) and Los Angeles smoggy air or clear air (abscissae) in 2 to 4 (*A*, *B*) and 18 to 20 (*C*, *D*) hours.

Results

The absolute volume of the residual air as a percentage of the normal predicted was determined in 14 subjects while they were breathing Los Angeles smoggy air and compared to the measurements after they had breathed filtered air for two to four hours. In seven subjects the comparison was made between breathing of Los Angeles clear air (nonsmoggy period) and breathing of filtered air for two to four hours. There was no significant difference between the results from smoggy and nonsmoggy periods (fig. 1*A*). The average percentage of residual air for the 14 subjects during the smoggy period was 220.4% as compared to 239.8% after two to four hours in the filtered-air room (table 2). In the seven subjects studied during the nonsmoggy period of breathing Los Angeles air, the average was 122.1% as compared to 152.6% after breathing of the filtered air. The volume of residual air as a percentage of total lung capacity increased after breathing of filtered air for two to four hours—52.5% as compared to 48.2% for smoggy air (fig. 1*B*). The seven subjects studied during nonsmoggy periods also showed a similar change in average percentage of total lung capacity—35% for filtered air and 29.4% for smoggy air.

The total vital capacity, timed vital capacity for three seconds, maximal breathing capacity, and ventilation factor measurements revealed, on an average, decreases after two to four hours' exposure to the filtered air (table 2). The alveolar nitrogen concentration showed no significant change after subjects had breathed oxygen for seven minutes. The results of the short exposure reveal no significant difference between smoggy and nonsmoggy periods, and the lung volume measurements, on the whole, showed definitely more impairment after subjects breathed the filtered air. Spirograms were obtained on 10 normal subjects (aged 22 to 34 years), employees of the laboratory or the hospital, during smoggy and nonsmoggy periods. Spirograms were again made after the subjects breathed filtered air for two to four hours, and no significant changes were noted. These data were not included in table 2, since the volume of residual air was not measured.

subjects for the nonsmoggy period was 224.8% as compared to 227.6% after breathing of the filtered air for 18 to 20 hours. The average residual percentage of total lung capacity after breathing of the clear air was 57.4% and after breathing of filtered air for 18 to 20 hours 58.4%, or no significant change (fig. 1*D*).

The measurements of total vital capacity, the timed vital capacity for three seconds, the maximal breathing capacity, the alveolar nitrogen concentration after seven minutes of breathing oxygen, and the ventilation factor showed no significant average change during either smoggy or nonsmoggy periods after subjects had been exposed to the filtered air for 18 to 20 hours (table 2). The decrease noted in the volume of residual air, although of small magnitude after 18 to 20 hours of exposure to filtered air during smoggy periods, was significantly different from the results obtained after short exposure (two to four hours) to filtered

TABLE 2.—*Effect of Type of Air Breathed on Lung Volume Measurements in Six Exposure Groups**

Determinations	A		B		C		D		E		F	
	Smog†	Filtered‡ (2-4 Hr.)	Clear§	Filtered (2-4 Hr.)	Smog	Filtered (18-20 Hr.)	Clear	Filtered (18-20 Hr.)	Smog	Filtered (40-90 Hr.)	Clear	Filtered (40-66 Hr.)
Vital capacity (supine)												
Observed, ml.	3,328	3,044	3,939	3,808	2,537	2,584	2,532	2,460	3,143	3,318	3,699	3,535
% of predicted	83.6	76.5	83.2	80.4	68.6	69.9	71.4	69.3	79.9	84.3	90.0	86.0
Timed vital capacity (3 sec.)												
Observed, ml.	2,191	1,963	3,493	3,192	1,925	1,921	1,494	1,395	2,171	2,360	2,375	2,455
% of predicted	57.2	51.2	73.6	67.3	52.8	52.7	43.7	40.8	55.5	60.3	58.3	60.3
Maximal breathing capacity												
Observed, liters/min.	48.5	45.3	105.5	101.9	47.0	47.0	30.8	29.4	55.6	60.0	66.3	62.1
% of predicted	43.3	40.4	70.6	68.2	44.7	44.7	32.1	30.6	47.9	51.7	52.3	49.0
Alveolar nitrogen value after 7 min. of breathing oxygen, %	6.83	6.59	2.20	2.68	5.01	5.30	6.86	6.95	3.29	2.50	1.29	1.16
Residual air												
Observed, ml.	3,097	3,389	1,641	2,051	2,571	2,318	3,412	3,455	2,970	2,540	2,642	2,694
% of predicted	220.4	239.8	122.1	152.6	185.2	167.0	224.8	227.6	203.4	173.9	184.7	188.3
As % of total lung capacity	48.2	52.5	29.4	35.0	50.3	47.3	57.4	58.4	48.6	43.4	41.7	43.2
Ventilation factor, %	50.4	46.5	75.4	67.4	53.4	53.5	43.9	43.0	54.1	59.6	57.8	57.0

*Group A: 14 subjects (2 women), av. age 59 yr., av. calculated body surface area 1.75 sq. m.; group B: 7, 36 yr., 1.86 sq. m.; group C: 13 (6 women), 58 yr., 1.72 sq. m.; group D: 7 (2 women), 64 yr., 1.71 sq. m.; group E: 22 (5 women), 55 yr., 1.75 sq. m.; group F: 3 (1 woman), 53 yr., 1.86 sq. m.
†Smog: breathing Los Angeles air during smoggy periods.
‡Filtered: breathing air filtered over activated carbon to remove smog.
§Clear: breathing Los Angeles air during nonsmoggy periods.

The volume of residual air as percentage of the normal predicted was compared in 13 subjects breathing the Los Angeles smoggy air (185.2%) and after breathing of filtered air for 18 to 20 hours (167.0%). In seven cases the comparison was made after breathing of Los Angeles clear air (224.8%) and after breathing of filtered air for 18 to 20 hours (227.6%). During the smoggy period the figure for residual air was slightly lower in eight cases, there was no significant change in three, and there was a slight increase in two cases (fig. 1*C*; table 2). In 10 of the subjects there was a slight decrease in the residual percentage of total lung capacity and in 3 a slight increase on breathing of filtered air (fig. 1*D*). The average percentage of total lung capacity after breathing of the smoggy air was 50.3% and after breathing of filtered air for 18 to 20 hours 47.3%. The measurements obtained during the clear air period revealed no significant change, except for one case in which there was an increase. The average percentage of residual air for the seven air. There was no significant change in the lung volume measurements in the group of subjects studied during nonsmoggy periods after they had breathed filtered air for 18 to 20 hours.

In 22 subjects the percentage of residual air was compared during smoggy periods and after breathing of filtered air for 40 to 90 hours, with an average time of 55 hours (fig. 2*A*). The absolute volume of the residual air was decreased in all 22 after prolonged breathing of filtered air (173.9%) as compared to breathing of Los Angeles smoggy air (203.4%) (table 2; fig. 2*A*). Volume of residual air as a percentage of total lung capacity was decreased in 21 subjects, with no change in one when breathing filtered air for 40 to 90 hours (43.4% for filtered as compared to 48.6% for smoggy air [fig. 2*B*]). The average percentage of residual air in three subjects breathing clear Los Angeles air was 184.7%, and it was 188.3% after breathing of filtered air for 40 to 66 hours. The residual percentage of total lung capacity was 41.7% for the

nonsmoggy period as compared to 43.2% after breathing of the filtered air, or no significant change (table 2).

In 14 subjects there was a slight increase in the maximal breathing capacity after breathing of filtered air for 40 to 90 hours, in 7 no significant change, and in one a slight decrease (fig. 2C). The average of the maximal breathing capacity as a percentage of normal predicted for the 22 cases after breathing the smoggy air was 47.9, as compared to 51.7% after breathing of filtered air.

cant change. The average of the timed vital capacity for three seconds while subjects breathed the Los Angeles smoggy air was 55.5%, as compared to 60.3% after breathing of the filtered air. The ventilation factor was increased from 54.1% on breathing of smoggy air to 59.6% with filtered air. There was no significant change in the timed vital capacity for three seconds, the maximal breathing capacity, or the ventilation factor in the three subjects studied during nonsmoggy periods and after breathing of filtered air (table 2).

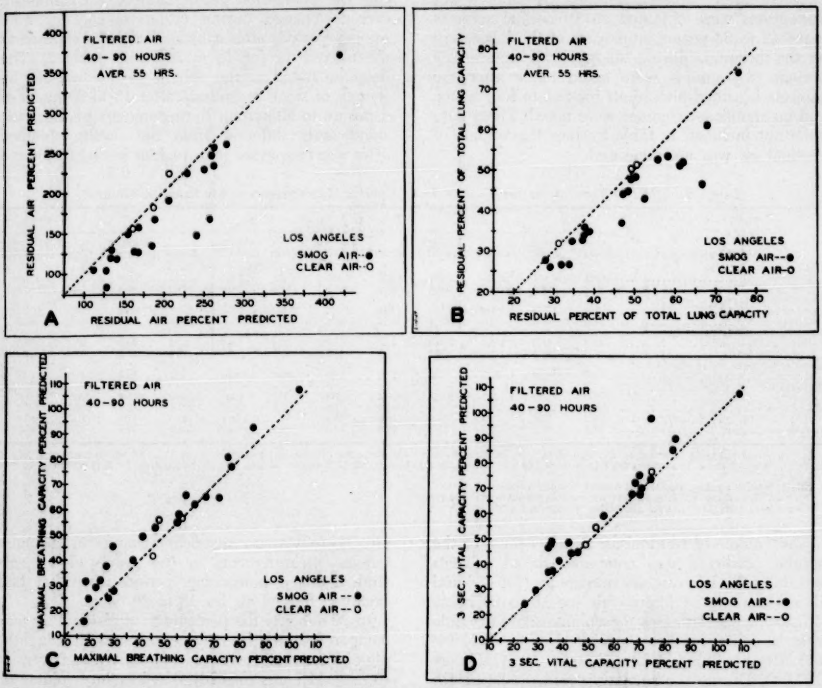

Fig. 2.—Comparison of effect of breathing filtered air with that of breathing smoggy air in 22 cases and clear Los Angeles air in 3 cases. Percentage of residual air (*A*) and percentage of total lung capacity (*B*) are plotted as in figure 1. Maximal breathing capacities as percentage of normal predicted (*C*) are plotted as abscissae for subjects who breathed smoggy air and as ordinates for those who breathed filtered air. Timed vital capacity for three seconds as percentage of normal predicted (*D*) is compared as with maximal breathing capacity data from *C*.

Bronchospasm was present in all cases. The maximal breathing capacity as a percentage of normal predicted was increased by one bronchodilator treatment from 1 to 30.0% (average 9.8% before and 7.8% after breathing of the filtered air).

In 13 subjects there was a slight increase in the timed vital capacity for three seconds after breathing of the filtered air, and in 9 there was no significant change.

The nitrogen washout time was studied with the nitrogen meter in 14 subjects breathing smoggy air and after breathing of filtered air for 40 hours or more (fig. 3). In group A (average of five subjects) the end tidal nitrogen concentration was 1% after six minutes of breathing oxygen, an essentially normal nitrogen washout time and indication of uniform air distribution in the lung. There was no

improvement in the nitrogen washout in group A after breathing of filtered air (average washout time, 49 hours). In group B the nitrogen washout was moderately prolonged, and an improvement was noted in four subjects after breathing of filtered air (average, 54 hours). In group C (average of five subjects) the nitrogen washout was markedly prolonged, indicating extensive disturbance in the uniformity of air distribution in the lung. The nitrogen washout was significantly improved after breathing of filtered air (average, 53 hours), indicating improvement in the uniformity of air distribution in the lung (fig. 3). The alveolar nitrogen concentration was slightly lower with breathing of filtered air as compared to smoggy air (table 2).

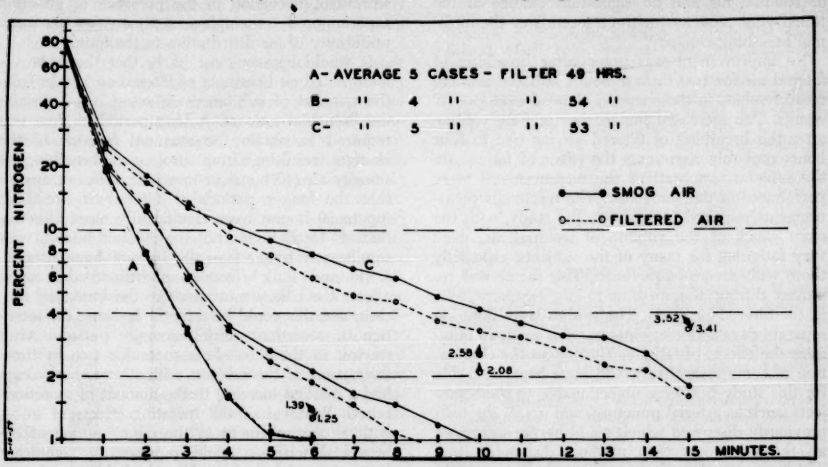

Fig. 3.—Comparison of rates of nitrogen washout in persons breathing oxygen. Data were obtained by means of nitrogen meter and continuous recordings of each breath for 14 subjects who had breathed filtered air 40 hours or longer. Percentages of nitrogen in expired air are plotted as ordinates with semilog paper and time of oxygen breathing as abscissae. In group A there was essentially normal nitrogen washout time to end tidal nitrogen concentration of 1% after six minutes of breathing oxygen; in group B, moderately prolonged nitrogen washout time; and in group C, marked prolongation of nitrogen washout on breathing of smoggy air. Average alveolar nitrogen concentration at end of washout is shown for each group.

Comment

In these studies, during smoggy periods in the Los Angeles area a significant improvement in lung volume could be measured quantitatively in subjects with emphysema after breathing of filtered air for 40 hours or longer. No significant changes were observed in volunteers without significant emphysema studied in a similar manner. An adequate number of studies has not been obtained to permit a comparison of blood–gas exchange measurements during smoggy periods, but preliminary data indicate that such changes are not as marked as those in lung volume. Studies have been obtained on pulmonary compliance in a few cases with a method previously described,[13] but more data are needed for evaluation.

Measurements of the carbon monoxide–diffusing capacity of the lung, by means of the steady state method of Filley and co-workers,[14] were obtained on five subjects before and after their residence in the filtered-air room for 44 to 64 hours (average, 48 hours). Although the number of studies performed was too small to allow evaluation, no significant difference was observed in carbon monoxide–diffusing capacity after breathing of filtered air, whereas there was a significant decrease in the residual air measurement. Carey [15] has reported impairment of diffusion capacity as a result of air pollution in Cincinnati.

The most significant improvement in lung volume measurements with breathing of filtered air was the decrease in the volume of residual air in the subjects with emphysema. The residual air measurement in persons with chronic pulmonary disease has a very wide spread with respect to the normal predicted value, one greater than that of any of the other tests of lung function used. In patients with emphysema the volume of residual air may be increased by bronchospasm, which frequently occurs during episodes of infection with retained secretions. Edema of the bronchial wall produces narrowing of the lumen, similar to

bronchoconstriction, also impairing the uniformity of air distribution in the lungs. Breathing of Los Angeles polluted air appears to induce similar changes in patients with severe chronic pulmonary disease. Exposure lasting two or more days is probably required to attain the maximal effect. A similar delayed effect before the previous condition was restored was noted after the smog was removed. The data in this study indicate that when the subjects breathed filtered air for less than 40 hours, such as 18 to 20 hours, the improvement was very much less, with only slight decreases in the volume of residual air and no significant change in the timed vital capacity for three seconds or the maximal breathing capacity.

No improvement was noted after breathing of filtered air for two to four hours, and the average measurements in these studies showed even poorer results. The increased impairment of lung volume after the breathing of filtered air for two to four hours probably represents the effect of fatigue on the subjects, since all of the measurements were performed on the same day. The numerous measurements required to complete the study, with the close check of the volume of residual air, were very fatiguing for many of the subjects, especially those with severe emphysema. This factor was removed during the medium-to-long-exposure tests in the filtered-air room. The studies were done on separate days and every attempt was made to minimize the effects of fatigue. This meant the elimination of some tests that would have been desirable for this study but were objectionable to some subjects (such as arterial puncture) and use of the tests previously discussed which could be performed on all the volunteers with minimal discomfort and which appeared to be most apt to detect slight changes.

The moderate duration (18 to 20 hours) in the filtered-air room produced a slight improvement in the subjects with emphysema but no significant change in the group without this condition. The decrease noted in the volume of residual air after breathing of filtered air for 18 to 20 hours during smoggy periods, although of small magnitude, was different from the result obtained after the short exposure (2 to 4 hours) to filtered air. The subjects studied during nonsmoggy periods had no significant change in lung volume measurements after breathing of filtered air for 18 to 20 hours.

The data on the 22 subjects studied during smoggy periods before and after breathing of filtered air for 40 hours or more are impressive because of the reduction noted in the volume of residual air in all cases and of the significance of this reduction in terms of physiological changes in the lungs. There was also a significant improvement in the timed vital capacity for three seconds and the maximal breathing capacity, although the magnitude of these changes was not as great nor as consistent as was that in the residual air measurement. In three subjects studied initially during nonsmoggy periods and then placed in the filtered-air room for 40 hours or more there were no significant changes in the measurements obtained.

Improvement in the uniformity of air distribution in the lung on breathing of filtered air (as demonstrated by the nitrogen washout curve) was most marked in the patients with severe emphysema, less marked in those with a moderate degree of emphysema, and lacking in the absence of significant emphysema (fig. 3). Bronchospasm, edema of the bronchial wall, and retention of mucus and secretions, occurring in the presence of infection superimposed on emphysema, increases the nonuniformity of air distribution in the lung.

It would appear most likely that the improvement noted on breathing of filtered air results from the removal of substances in smog which irritate the bronchial mucosa. A long period of time was required to obtain the maximal reversal of the changes resulting from prolonged breathing of smoggy air (40 hours or more). It does not appear that the longer periods of filtered-air breathing (up to 90 hours) were significantly more effective than 40 to 50 hours, but the 40-hour interval was significantly better than the 18-to-20-hour interval. Kotin and Falk [8] have demonstrated that smog affects the ciliary movement of the bronchial mucosa, and this could be a factor favoring the retention of secretions during smoggy periods. After staying in the filtered-air room for two to three days, some of the subjects with severe emphysema had a marked increase in the amount of secretions raised. Removal of the irritating effects of smog, with an improvement in the ciliary action of the bronchial mucosa, could represent a significant factor in promoting the bronchial drainage noted clinically.

These studies indicate that the impairment produced by breathing smog aggravates the pulmonary insufficiency already present in chronic pulmonary disease. This response may be reversed by removing the smog from the air breathed, but there is a delay in the disappearance of such adverse effects. These data also indicate a lag in the onset of the maximal effect from breathing of smoggy air, so that a delay of two days or more could be expected before the maximal adverse effects were produced by the concentrations of the pollutants that now exist in the Los Angeles basin. Delayed response has been observed clinically during acute episodes of air pollution such as occurred in the Meuse Valley in Belgium, in Donora, Pa., and in London.

The health aspects of air pollution were regarded of sufficient importance in 1955 by the 84th Congress to merit scientific study and passage of Public Law 159, which established the air pollution medical program of the division of special health services, Department of Health, Education, and Welfare. This agency was instructed to determine whether or not and in what ways air pollution

modified health among human populations.[16] That smog constitutes an important health problem in Los Angeles was indicated by the resolution proposed by the smog committee and adopted on Dec. 8, 1958, by the council of the Los Angeles County Medical Association, as follows: "The Smog Committee of Los Angeles County Medical Association reiterates that air pollution represents a present deleterious influence on the public health, as well as an imminent danger of catastrophic proportions. There are many different air pollutants which are injurious to health. Every opportunity should be taken to diminish them. Sulfur dioxide is one of the harmful components of air pollution which must be controlled."

The reaction of the air pollutants with other substances may increase their toxicity as combined smog and fog. Amdur [17] has shown that an aerosol of sodium chloride markedly increases the acute effects of low concentrations of sulfur dioxide on airway resistance in the guinea pig. Sulfur dioxide concentrations in Los Angeles air are highest at night and at a time when fog is more prevalent.

Activated carbon filters have been recommended for use both at home and in the office by patients with severe emphysema residing in smoggy areas. Some new buildings erected in Los Angeles have air conditioning combined with air filtration over activated carbon to remove smog. Portable activated carbon filters are being used at the Hospital of the Good Samaritan during periods of severe smog as a part of the treatment regimen for some patients with advanced pulmonary emphysema. The use of the carbon filter has been observed clinically to be of significant value in treating the patient with severe emphysema who suffers superimposed infection and bronchial obstruction in the presence of smog. The adverse effect of smog as demonstrated in this study provides a rational basis for the use of carbon filters and justifies their expense.

Conclusions

Significant objective quantitative improvement in the ventilatory characteristics of persons with severe pulmonary emphysema occurred after filtered air was supplied to replace the smoggy air of Los Angeles. The severity of the emphysema was aggravated by smog, but this effect could be reversed by breathing of filtered air for 40 hours or more, which demonstrated a delay in the disappearance of the effect. Measurement of residual air was the most sensitive test used in this study, and an increase in this measurement represents an early effect of smog. No significant changes in lung volume measurements were demonstrated from the breathing of filtered air as compared to smoggy air by the essentially normal person.

The use of activated carbon filters both at home and in the office has been recommended for patients with severe emphysema residing in smoggy areas. These studies suggest that the Los Angeles smog could present a serious problem for the person with chronic respiratory disease during prolonged periods of adverse weather conditions with high concentrations of air pollutants.

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PROBLEMS ASSOCIATED WITH ASPIRATION OF GRASS HEADS (INFLORESCENCES)

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Grass heads, such as the inflorescences of timothy and barley, have on occasion been aspirated into the lungs, especially by children. Fourteen new cases are here added to 51 described by previous authors. The foreign body usually descends into the right bronchus rather than the left. The inflorescence of timothy is classed as nonextrusive; it generally remains in the bronchus until removed by bronchoscopy or pulmonary resection. Inflorescences like those of barley are classed as extrusive because they are so barbed that respiratory movements may carry them through lung tissue and pleura until they finally reach the outside through a sinus. Early symptoms after the aspiration are severe and alarming; pneumonitis invariably appears, often within 24 hours. On the basis of their own experience the authors recommend immediate bronchoscopy. If it fails they advise performing early thoracotomy rather than waiting for spontaneous extrusion.

Aspiration of a foreign body is not uncommon and management of the resulting syndrome is standardized. However, it is less well known that the inflorescence, or flower-bearing part, of a grass may be inhaled and may cause characteristic pulmonary disease. The purpose of this paper is to bring this little-known clinical syndrome to the attention of physicians and to emphasize certain points in its diagnosis and management.

The first reported case was that of a young French nobleman, Armand de Bautrée, who, it was reported in 1662, had carelessly put an ear of barley in his mouth. It adhered to his palate and he was unable to extract it. The ear was aspirated. He endured "a violent fever accompanied by a great difficulty in breathing, a dry cough, afterward spitting of blood, sleeplessness, and a great pain in his right side. A tumor at length appeared on that side and a surgeon extracted from it an ear of barley. . . ." [1]

Jackson's [2] paper of 1952 dealing with 35 cases of grass-head aspiration, including 7 from his personal files, is a classic in this field; in it is to be found the bulk of the basic knowledge on this subject. In our review of the literature we have found 16 more cases [3] and a search of the Mayo Clinic files revealed another 14. Information on these 65 patients forms the basis of this paper.

Botanical Considerations

The plant family Gramineae (grasses) is characterized by a typical head, or inflorescence, the unit of which is the spikelet (fig. 1). These are arranged in rows and project upward at an angle from the rachis, or central axis, of the inflorescence. A spikelet is a group of one to five sessile flowers borne on a short axis or rachilla. At the base of the spikelet, enclosing the flower or flowers, are two bracts, called glumes. These are the lower glumes. Two other bracts, the flowering glume and the palea, are immediately adjacent to each flower. The glumes can be of various shapes, for example blunt, sharp, or boat-shaped. Some have a needle-like projection, or awn, which may be attached to its tip (terminal awn) or to its back (dorsal awn). The spikelets of the inflorescence may be either loosely arranged, as in the genus Avena (oat), or tightly packed, as in Phleum pratense (timothy). The inflorescences of many grasses are often referred to as spikes.[4]

Among the 65 cases accurate classification of the grass head or inflorescence was a rarity. In 13 instances such nonspecific terms as grass spike, cereal spike, head of grain, head of grass, and ear of grain were used to describe the particle.[5] Most frequently only a common name was used, such as barley, wild barley, oat, wild oat, wild wheat, rye, millet, rice, foxtail, and cattail.

However, in some cases the inhaled inflorescence was accurately classified (table 1).[6] In 17 instances timothy grass inflorescences were apparently inhaled. The timothy grass, Phleum pratense, is widely cultivated in the pastures of the well-watered northeastern sector and northwestern coastal areas of the United States [7] as well as in Europe and the temperate parts of Asia and of the Southern Hemisphere (fig. 2).[4] It is interesting that its aspiration has been reported only from North America. Jackson [2] identified Phleum pratense in

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seven cases. Woolley [3g] published reports of two instances of the aspiration of an inflorescence of the "common timothy grass." The inflorescence in eight of our patients was recorded as a timothy head and this probably was indeed Phleum pratense (cases 1 to 8). In two cases in which the specimen was available we identified it as such (cases 5 and 7).

Many instances of aspiration of an inflorescence of the barley grasses (Hordeum) have been reported. This genus is indigenous to the temperate zones of both hemispheres, and in the United States flourishes in the dryer grasslands of the southwest.[4] One variety, Hordeum murinum, wall barley, is well known to cattlemen (fig. 2). Its inflorescence can penetrate crevices in the mouths of animals and has killed horses and cattle by perforating their intestines.[8] It was responsible for the illness of one of Godfrey's [3h] patients. Windsor [3b] reported

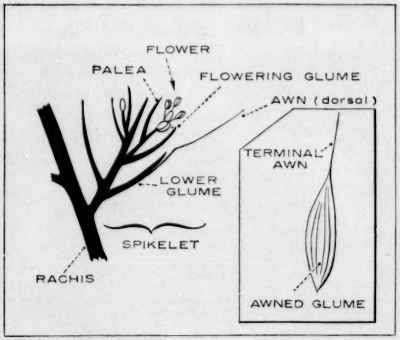

Fig. 1.—Diagrammatic representation of parts of inflorescence or grass head. Inflorescence contains many spikelets which project at angle from rachis or central axis. Lower glumes, flowering glume, and palea all form chaff. Awn is whisker-like projection from dorsum or apex (*inset*) of glume.

a case in which a spike of Hordeum leporinum was inhaled, and in one of our patients the spike was that of Hordeum, probably murinum (case 14). Including these three instances, and also one of our cases (case 12) in which the barley was not classified, aspiration of a barley spike has been recorded 14 times.[9] We believe this number would be greater if accurate classification of the inflorescence were available in more of the 65 cases.

The next most frequently inhaled grass heads belong to the genus Avena or Trisetum, the oats, and their aspiration has been reported in five cases. Accurate classification was available in two; these were Avena fatua and Trisetum flavescens.[10] Because of the loose nature of the inflorescence it is likely that merely a spikelet was inhaled in most of these. In one of the reported instances the foreign body was called "an oat," [2] while in a case of ours it was described, by the person who performed bronchoscopy, as a "hull of oat with four spicules attached" (case 13). This genus has fairly typical inflorescences, and it seems reasonable to assume that these five cases are probably accurately classified.

TABLE 1.—*Types of Grass Heads (Inflorescences) Accidentally Aspirated*

Common Name	Classification
Timothy	Phleum pratense
Barley	Hordeum
Oat	Avena (syn. Trisetum)
Rye	Secale
Foxtail	Alopecurus
Sandbur	Cenchrus
Wheat	Triticum
Brome	Bromus

The inflorescences of the rye and the foxtail genera, Secale and Alopecurus, have also been aspirated a number of times.[11] It would seem to us that they could easily be mistaken, by the inexpert, with each other and with those of Hordeum, Triticum, and Bromus (barley, wheat, and brome grasses). Borrie's [3i] patient aspirated an inflorescence of the brome grass, Bromus catharticus, and died. Two of our patients inhaled inflorescences that in the operative note were called sandburs. Since these are so typical in appearance we feel that, indeed, they probably belong to the genus Cenchrus (cases 9 and 10).

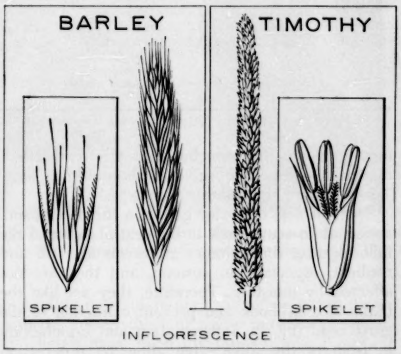

Fig. 2.—Inflorescences of timothy (Phleum pratense) and wall barley (Hordeum murinum). Insets represent their respective spikelets (enlarged). Glumes and awns projecting at angle from inflorescence prevent its expectoration, and, those of barley being stiffer and more resilient, may allow it to be driven through lung and chest wall.

Pathology

When an inflorescence is aspirated it always enters the respiratory passages with the stump of the rachis (or rachilla in the case of a spikelet) leading and with the glumes and the awns, if present, trailing. This has bearing on its subsequent behavior.

Clinically there are two types of inflorescence: One remains in a bronchus unless removed at endoscopy, while the other is forced, by respiratory movements, toward the periphery of the lung and sometimes even through the chest wall.[13] We refer to the first type as nonextrusive and to the second type as extrusive. The inflorescences of different genera of grasses have varying characteristics and these, to a large extent, determine the type.

The spikelets of the genus Phleum, to which timothy grass (Phleum pratense) belongs, lie flat against the rachis and are small and crowded, forming a cylindrical inflorescence. The glumes of timothy, about 2 mm. in length, are thin and membranous, lack an awn, and become soft when moistened on inhalation (fig. 2). There is some tendency for an inflorescence of this species to migrate down the bronchus, but this tendency is not great enough to drive it through the lung. Timothy is of the nonextrusive type.[13]

The spikelets of barley grass, on the other hand, are set at an acute angle to the central rachis of the inflorescence, their glumes and awns are stiff and resilient, especially in autumn, and they are not affected by moisture. Therefore, they act like the barbs of a fishhook and prevent extraction of the grass head (fig. 2). Inflammation and liquefaction in front of the spike often allow its progression through the lung and chest wall, and it reaches the outside through a sinus.[2] Woolley [3e] has noted that if it is aspirated during early summer, while soft and immature, the spike does not perforate the chest wall.

The inflorescences of most of the other grass genera behave like barley and are grouped into the extrusive type. However, in the two cases in which a sandbur was inhaled the bronchoscopist was able to extract it. In both it had lodged in a large bronchus, namely, the right lower-lobe bronchus and the right main bronchus respectively (cases 9 and 10). We have classified sandburs as belonging to the nonextrusive type and postulate that the short stiff spines projecting in all directions from these small, roughly spherical inflorescences prevented their being forced deeply into the lung.

Incidence

As is usual with aspirated foreign bodies, the majority of patients are young children, although adults and adolescents are not immune. In only 14 of 55 cases in which the age was recorded was the patient more than 10 years old. The sex was recorded in 50 patients—31 males and 19 females. Since grasses flower in the warmer months, it is obvious that most patients become afflicted in either summer or autumn. The month of aspiration, recorded in 13 of our cases, fell between the first of May and the end of October in every instance.

TABLE 2.—*Data on Fourteen Mayo Clinic Patients Who Aspirated Grass Heads*

Case	Sex	Age First Seen, Yr.	Month Inhaled	Inflorescence	Site*	Length of Lodgment	Treatment	Results
1	M	1 8/12	June	Timothy, 1.0 x 0.4 cm.	L.M.B. & L.L.L.	3 day (?)	Bronchoscopy	Recovery; accidental death 14 yr. later
2	M	3	June	Timothy	R.L.L.	26 mo.	Bronchoscopy	Residual bronchiectasis, lobectomy 10 yr. later, eventual recovery
3	M	20	June	Timothy, 5.5 x 0.5 cm.	R.L.L.	7 day	Bronchoscopy	Recovery
4	M	1 2/12	August	Timothy	R.M.B.	1 day	Bronchoscopy	Recovery
5	M	5 6/12	October	Timothy, 2.5 x 0.5 cm.	R.L.L.	9 mo.	Segmentectomy	Recovery
6	M	2 9/12	July	Timothy, 1 in. long	R.L.L.	20 hr.	Bronchoscopy	Recovery
7	M	3 8/12	June	Timothy, 4 x 1 cm.	R.L.L.	34 mo.	Lobectomy	Recovery
8	M	1 3/12	June	Timothy	L.M.B.	10 hr.	Bronchoscopy	Recovery
9	F	2 6/12	May	Sandbur	R.L.L.	22 mo.	Bronchoscopy	Recovery
10	F	1 3/12	August	Sandbur	R.M.B.	5 mo.	Bronchoscopy	Recovery
11	M	18	October	Cattail (?)	R.L.L.	8 yr.	Lobectomy	Recovery
12	M	5	September	Barley (?)	L.L.L.	14 mo.	Bronchoscopy	Recovery
13	F	8/12	July	Oat (spikelet?)	R.M.B.	1 day	Bronchoscopy	Recovery
14	F	11 8/12	Unknown	Hordeum (murinum ?) (barley)	R.L.L.	9 yr.	Lobectomy	Recovery

* L.M.B. = left main bronchus; L.L.L. = left lower lobe; R.L.L. = right lower lobe; R.M.B. = right main bronchus.

Symptomatology

In many of the reports detailed clinical data are lacking, and we have found that anything approaching a full statistical analysis is impossible. The following discussion of symptomatology, therefore, will be conducted in a general manner (table 2).

Diligent questioning frequently elicited a history of the accident. The child may have been seen playing with or "smoking" a grass head. Sometimes it is thought to have been inhaled or swallowed. Six of our patients (cases 1, 3, 4, 6, 8, and 13) came to the clinic within a week of their accident. Five gave a history of aspirating a grass particle and one was sent by a physician who suspected a foreign body. Our remaining eight patients had retained their inflorescences for periods ranging from five months to nine years; five of these (cases 2, 5, 10, 11, and 12) gave a history of inhaling or "swallowing" a foreign body which, in three, was known to have been a grass head. One patient (case 9) had a sudden onset of respiratory symptoms, but aspiration of a foreign body does not seem to have been

considered. In the other two patients (cases 7 and 14) there was neither a history of aspirating a foreign body nor a history of the onset of acute symptoms. All these eight patients had been under a physician's care many times and had been hospitalized once or more during their illness. Bronchoscopy had been performed on six of these patients before they came to us, but the diagnosis of an aspirated foreign body had not been made. Two of the eight patients had been treated for pulmonary tuberculosis, and one had spent 14 months in a sanatorium; tubercle bacilli were identified in neither case.

The initial symptoms, while common to inhalation of all foreign bodies, are frightening to the lay observer. There is sudden choking, coughing, and cyanosis, and gagging, retching, and vomiting are common. Jackson [2] has pointed out that an asthmatoid wheeze, although uncommonly noted by the lay observer, is an almost invariable initial symptom. This was a presenting symptom in three of our 14 patients (cases 4, 7, and 9); two of these, in whom the grass head had been present for many months, had continuous wheezing. After the startling initial stage a symptomless interval ensues. During it there may be an occasional cough or wheeze and the child may be apprehensive and sleepless (case 6).

Invariably pneumonitis develops quickly, often within 24 hours, and with it rapid pulse, fever, and labored respiration. It is usually thought to be simple pneumonia. Paroxysms of coughing may continue, with attacks of choking and cyanosis. In time the cough becomes productive and the sputum purulent and often blood-streaked. Later there is frankly foul expectoration and the breath is fetid. All the stigmata of chronic pulmonary disease are apparent: The temperature is elevated, there are drowning sweats and chills, the child becomes wizened and fails to gain, and thoracic osteoarthropathy may be noticed.

Hemoptysis is common. It is usually recurrent and may even occur daily. Massive hemorrhage may occur,[14] but small amounts of blood are the rule. Eight of our patients reached the chronic stage; hemoptysis was recorded in five. Before coming to the clinic one (case 12) had coughed up blood so many times that he needed several blood transfusions. Another patient (case 14) had a severe hemoptysis, amounting on one occasion to a pint. One of the physicians who saw this patient before she came to us suspected a vascular tumor. Anemia would be expected, but in our eight patients who reached this chronic stage the concentration of hemoglobin was not significantly depressed.

Although pain has not been frequently mentioned, either in our cases or in the previously published cases, it must be a feature in many. It can be due to pleurisy over the inflammatory process in the underlying lung and it must be excruciating when a grass head burrows through the chest wall.[1] A foreign body in the right lower lobe can cause right-sided abdominal pain and even muscle rigidity. This had led to appendectomy in four patients; all the appendixes were normal and their removal gave no relief.[15] Spontaneous expectoration of a timothy head has not been reported, but in three cases an extrusive inflorescence has been coughed up.[14] In all, massive hemorrhage was a feature. One patient needed emergency lobectomy under heroic conditions for its arrest.[3b] Verrotti [3c] made the interesting observation that the grass head, in his case, was expectorated in the center of a large clot.

Fig. 3.—Roentgenograms from patient in case 8, showing obstructive emphysema of left lung. Timothy grass inflorescence that lodged in left main bronchus was removed 10 hours after its aspiration. Roentgenograms were taken during (*left*) inspiration and (*right*) expiration.

Physical Signs.—The physical signs are usually found over the base of the right lung. The right bronchus is more vertical than the left and is therefore the usual lodging site of a foreign body. The side in which the inflorescence had lodged is recorded in 42 of the 65 cases; it was the right in 38.

Referring to grass heads, Woolley [3e] has pointed out that ". . . lack of density [of an inflorescence] precludes either complete or ball-valve bronchial obstruction and development of massive atelectasis or emphysema." However, as Jackson [2] mentions, these processes do occur, although perhaps to a lesser degree than with some other foreign bodies. There is decreased expiratory excursion on the affected side. Resonance is diminished or increased, depending on whether there is collapse or obstructive emphysema. Breath sounds are diminished or absent.

The pneumonitis caused by an inflorescence is characterized by a large amount of inflammatory exudate which fills up the adjacent bronchioles and bronchi. Then breath sounds cannot be transmitted, so they are decreased or absent. In true pneumonia, tubular breathing would be heard.[2] In chronic cases there are signs of retained bronchial secretions and persistent pneumonitis in the base of the affected lung.

X-ray and Bronchoscopic Findings.—In the early stage thoracic roentgenograms show localized emphysema or collapse. In case 8 a roentgenogram taken 10 hours after the accident showed obstructive emphysema on the left (fig. 3). A head of timothy grass was removed from the left main bronchus. When pneumonitis ensues, the picture of consolidation will be superimposed on the underlying tendency to emphysema or atelectasis. In case 1 a roentgenogram taken about three days after the aspiration of a timothy head showed consolidation of the left upper lobe superimposed on lobar collapse (fig. 4). The grass inflorescence was found lying in the left main bronchus and obstructing the branch to the upper lobe. When chronic disease of the lung has developed, the x-ray findings are somewhat nonspecific. There is typically an area of persistent pneumonitis in the affected base, usually the right (fig. 5*a*). Bronchiectasis often seems the likely diagnosis. Bronchoscopy should be undertaken; if no foreign body is found, bronchograms should be made and these will usually confirm this impression.

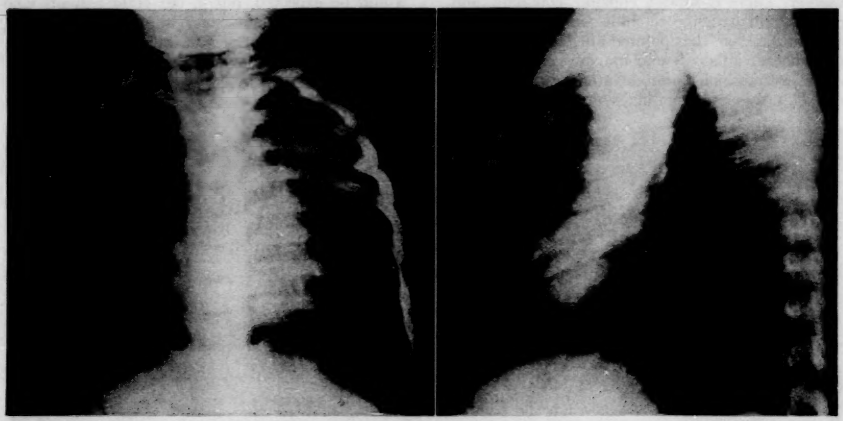

Fig. 4.—*Left*, posteroanterior and *right*, left lateral roentgenographic views from patient in case 1, demonstrating acute pneumonitis superimposed on collapse of left upper lobe. Inflorescence of timothy grass was removed from left main bronchus after stay of about three days. It had obstructed orifice to left upper-lobe bronchus.

Treatment

When possible, endoscopic removal is performed. In the total of 19 cases of nonextrusive inflorescence there were 17 timothy heads and 2 sandburs (cases 9 and 10), and bronchoscopic removal was possible in 16. In three of the timothy-grass cases in which thoracotomy was necessary the grass head had been in the bronchus for 9, 10, and 18 months, respectively, while of the 14 patients who had aspirated timothy heads and on whom endoscopy was successful all but 2 retained the foreign body for shorter periods, namely, 9 months in one [2] and 26 months in the other (case 2) (fig. 5). The patient in case 2, it is interesting to observe, had a lobectomy done elsewhere 10 years later for residual bronchiectasis. It would seem that when a timothy inflorescence is present for more than nine months, resection is usually necessary. There were no deaths in patients who aspirated a nonextrusive type of inflorescence.

Of the 65 patients 46 probably inhaled an extrusive grass head. Of these, actual extrusion through the chest wall or the loin took place in 31 and spontaneous expectoration in 3.[14] In only three was bronchoscopy successful. Resection was necessary in seven (fig. 6). Of these 46 patients 2 died.[16]

Follow-up Observations.—The results of follow-up examination were available on all our patients at the time of preparing this report. Except for one patient who died accidentally, all were well and none had any respiratory symptoms. Recent thoracic roentgenograms were available from four of the patients, two of whom (cases 3 and 10) had aspirated an inflorescence which was removed bronchoscopically and two of whom (cases 7 and 14) had originally required lobectomy. None demonstrated any disease of the lungs.

In the literature the information concerning late results is rarely detailed. Most patients have apparently recovered fully; however, bronchiectasis does seem to be a rare sequela. Reference has been made to one such case, and Woolley [26] recorded two more

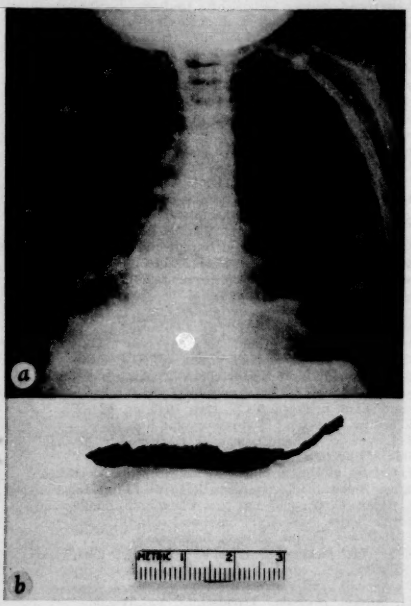

Fig. 5.—*a*, roentgenogram of patient in case 2, showing pneumonitis in base of right lung. Similar findings were present in many cases. *b*, timothy grass head, aspirated 26 months previously, was removed at bronchoscopy from right lower-lobe bronchus of patient in case 2.

in which minimal bronchiectasis, largely asymptomatic, was found four and six years, respectively, after bronchoscopic removal of the grass heads.

Two patients died as a direct result of inhaling a grass head, an extrusive type in each instance. A 12-year-old boy, reported on by Herbert Mayo in 1839, happened to have an ear of rye in his mouth

Fig. 6.—*Top*, roentgenogram of patient in case 7, showing pneumonitis in right lower lobe. It is similar to that in figure 5. *Bottom*, resected segment from right lower lobe. When it was sectioned, timothy head, surprisingly well preserved after having been inhaled 34 months previously, was found in bronchiectatic cavity.

while riding in a carriage. The carriage gave a jolt and the ear of rye disappeared. Later the patient died. Autopsy disclosed an abscess involving the liver and lungs. "On inspection, the ear of rye was found sticking, part in the liver, part in the lungs."[16]

Borrie [31] reported on a female infant, one year of age, who was admitted to the hospital in extremis. She appeared to have bronchopneumonia and was placed in an oxygen tent. Unfortunately, she died within two hours. At postmortem examination abscess of the lung, empyema, widespread collapse,

and bronchopneumonia were found. A head of brome grass (Bromus catharticus) measuring 6 by 0.75 cm. was found in the pleural cavity.[17]

Comment

Despite the fact that many cases must have gone unreported, the aspiration of a grass inflorescence is obviously a rarity. However, it may lead to serious intrathoracic problems and we believe this diagnosis should be considered when a child is suspected of having inhaled a foreign body while out of doors during summer or autumn.

Prevention, as in most diseases, is the most effective means of combating the problem, and aspiration of any foreign body is frequently due to carelessness. As has often been pointed out, the mouth should not be used for holding inedible objects. When infants are put on the grass they should be placed on a large sheet or blanket, and children should not be allowed to play games in which grass heads are put in the mouth or "smoked."

Report of an early diagnosis has not been encountered in the literature. In reviewing the histories of our cases and those of others it is obvious, as Mahoney [3d] has pointed out, that frequently, even though a history of aspirating the foreign body is available, it is forgotten or ignored by parents and physicians alike. Minor respiratory ailments are usually diagnosed at the early stage. Other misdiagnoses include whooping cough, bronchopneumonia, asthma, diphtheria, pulmonary tuberculosis, chronic bronchitis, bronchiectasis, tubercular rib, vascular tumor, and acute appendicitis. It is obvious, on reviewing our cases and those in the literature, that the majority of these patients have been ill for many months and years because the true nature of their disease was never suspected.

Immediate bronchoscopy is clearly indicated in all cases, since when a nonextrusive inflorescence has been inhaled it can usually be removed. However, only one instance of endoscopic removal of an extrusive type of inflorescence has been reported previously,[3g] and we are reporting two herein (cases 12 and 13). Jackson [2] has concluded that open intervention is probably not indicated when an extrusive type of inflorescence is inhaled, because spontaneous extrusion through the chest wall should be anticipated within six weeks. However, we believe that, after bronchoscopy has been unsuccessful, early thoracotomy ought to be undertaken. If not, serious disease or even death can result, and with the safety of modern chest surgery there is little excuse for awaiting spontaneous extrusion of the inflorescence.

Summary

Grass heads (inflorescences) have occasionally been aspirated. They can cause serious pulmonary disease. We have added 14 cases to those already reported, bringing the total to 65.

Most patients are children, and the base of the right lung is usually affected. The inflorescences of the various grasses compose two clinical types. The nonextrusive type, such as a timothy spike, lodges in a bronchus and can usually be removed by the endoscopist. The extrusive type, such as a barley head, is rapidly driven, by respiratory movements, toward the periphery of the lung and can rarely be found by the bronchoscopist. Early thoracotomy and resection of the affected portion of the lung are recommended. If neglected, an extrusive inflorescence sometimes appears through a sinus in the chest wall. Residual bronchiectasis has been an occasional sequel, and on two occasions an extrusive grass head has caused death.

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THE MEDICARE PROGRAM—PROBLEMS IN PERSPECTIVE

Brig. Gen. Floyd L. Wergeland (MC), U. S. Army

The Medicare act, which became effective Dec. 7, 1956, provided that dependent spouses and children of members of the uniformed services on active duty were henceforth to receive certain specified medical care as a legal right. Beneficiaries were to choose freely between service hospitals and civilian physicians and hospitals. The result was to increase the 415,000 dependents who received in-hospital care in service hospitals in 1956 to a total of nearly 700,000 who received care in service hospitals and civilian hospitals combined in 1957 and 1958. This over-all increase was accompanied by a decrease of service hospital admissions to a point below their optimum operating level. The program was restricted, effective Oct. 1, 1958, to stay within budget limits and comply with the desire of Congress that service hospitals be used at optimum capacity. The restrictions have operated so as to achieve optimum levels in service hospitals, but there has also resulted a substantial decrease in the over-all number of dependents receiving care. The goal of the program is to have the total amount of care returned to a proper level.

On Dec. 1, 1958, I talked to the Clinical Session of the American Medical Association at Minneapolis. In the six months between that date and today, we have tabulated a tremendous amount of data on the Medicare program. Study of this material throws new light on the whole program and places our administrative problems in a new perspective. I will limit this presentation to one or two of the major points.

Service hospitals have, for a long time, provided care for dependents of men in uniform. However, they could not provide for all dependents. Some dependents, especially those separated from their sponsors, lived too far away to have access to a service hospital, or the hospital was not in a position to provide the care needed at the time.

By 1956, service hospitals were handling about 415,000 dependent admissions a year. Many of them were overcrowded; yet, despite the best efforts of the hospitals, many dependents were paying for their own care. After a study by the Moulton Commission in 1953 and subsequently by the armed services and congressional committees, the Medicare act (public law 569, 84th Congress) was passed. It became effective Dec. 7, 1956.

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Major Provisions of Medicare Act

The act provided that dependent spouses and children of members of the uniformed services on active duty were henceforth to receive certain specified medical care as a legal right. Congress began by providing that service hospitals were to continue giving the care they were giving to all types of dependents. With this as part of an incompleted program of medical care for all dependents Congress completed the program by providing that civilian physicians and hospitals were to be used to supplement service hospitals in providing certain specified care for eligible dependents of active duty personnel who required hospitalization. Henceforth, service hospitals and civilian hospitals and civilian and military physicians were to be teamworkers in a common enterprise.

The act provided that the spouses and children of uniformed personnel on active duty were to have the privilege of choosing freely between service hospitals and civilian physicians and hospitals. It further specified (sec. 201 C, public law 569, 84th Congress) that the right to such free election for dependents living with sponsors could be limited under regulations to be prescribed by the Secretary of Defense, after consultation with the Secretary of Health, Education, and Welfare, when adequate medical facilities for care were available in service hospitals.

There was no way of knowing how many admissions would be handled by civilian physicians and hospitals under the expanded program. Early estimates were that about 40% of all dependents needed this supplemental care in civilian hospitals. Experience has shown that this was a good estimate.

Growth and Reduction of the Program

The program grew with great speed; 90 days after it began, the total number of dependents of active duty personnel cared for increased to an annual rate of about 70% more than in the previous year, when care was available only in service hospitals. The total rate, for admissions in service hospitals and in civilian hospitals taken together, has increased very little since then. At the peak period, in the third quarter of the calendar year, 1958, the total program was only 7% larger than during the first quarter of its existence—an increase that hardly kept pace with the increase in the num-

Read before the Section on Military Medicine at the 108th Annual Meeting of the American Medical Association, Atlantic City, June 9, 1959.

ber of dependents. In summary, the expanded program came into being, found a need, filled it almost immediately, and leveled off.

The expanded program, utilizing both service and civilian hospitals on a free-choice basis, filled an existing need by providing care for dependents who previously had to pay for care themselves. However, it also caused a shifting of a fairly substantial number of dependents who would normally have received care in service hospitals to civilian sources of care.

Part of this was desired because many service hospitals were overcrowded. But it went too far, and, in the spring of 1958 during the hearings on the appropriation for fiscal year 1959, the Congress recommended that the exception to the "free choice" principle embodied in the original Medicare act be enforced. Thus, service hospitals would be utilized to the optimum extent before dependents living with their sponsors were allowed to use civilian physicians and hospitals at government expense.

Since our service hospital systems must, to a considerable extent, be maintained on a ready-available basis in the event of hostilities, it is obviously a wise economic policy by Congress to see that such currently available facilities are used to provide care for dependents, up to the level of optimum operating efficiency. To achieve this goal is not an easy matter.

The over-all objective is in essence to preserve the identity and independence of service and civilian medical facilities but at the same time to coordinate them into a unified system which will provide effective, economical, uniform care to the spouses and children of men in the services, without adversely affecting either the military or the civilian practice of medicine.

Eligible Dependents

The statistical universe of dependents to be served by the Medicare program consisted of all dependent wives and children of active duty personnel. However, though the act was effective throughout the world, in practical terms it was largely limited in its civilian application to dependents living in the continental United States, Alaska, Hawaii, and Puerto Rico.

Our recently completed statistical studies showed that the 3 million dependents produce annually about 700,000 hospital cases. If permitted to exercise free choice, about 325,000 hospitalized dependents (about 45%) would use service hospitals and about 375,000 (about 55%) would use civilian facilities. Unfortunately, the distribution of cases shown here between service and civilian hospitals represents an underusage of facilities which must be maintained by service hospitals. Therefore, it was necessary to reverse these percentages, plus a little more which cannot be exactly determined in advance.

Developing procedures to reverse these percentages would have been difficult in itself. Unfortunately, as Rabelais' Gargantua puts it, we were at the same time "subject to a disease which at that time they called lack of money." Available funds simply would not cover the cost of our unrestricted free-choice program. This combination of problems created more than a routine predicament—it was a crisis.

Meeting the Money Crisis

The first step, and the one we were least willing to take, was to make certain that program costs for care in civilian facilities were reduced to a level that available funds permitted. This restriction applied to all dependents, whether living with or separated from their sponsors. The projected savings were, of course, a variable figure, dependent in part on another variable—the extent to which patients could be shunted to and cared for by service hospitals. This enigmatic lurking-in-the-background problem of service hospital capacity proved to be an insoluble one. Close study revealed that "optimum capacity" was a highly variable thing. As strength (and needs) of the armed forces change, as the intake of various types of cases fluctuates, as medical staffing changes, as seasonal fluctuations have their effect, as communicable diseases come and go, there will be corresponding changes in the significance of the term.

It was evident that the only general principle that could be applied on a priority basis was this: Dependents living with a sponsor and needing care would have to be required to seek it from service hospitals and could be allowed to use civilian facilities at government expense only if service hospitals were unable to provide the needed care. Dependents residing apart from sponsors, or on trips, would continue to have advantage of the free-choice principle for authorized care, merely by presentation of their identification card (DD form 1173) or other proper identification.

Decentralized Control of Permit System

Implicit in this principle was the fact that the only people who could determine the meaning and measurement of reasonable hospital capacity were the men on the spot who knew the hour-to-hour changing balance between needs and available facilities. Accordingly, that was the way the permit system was set up. The basic requirement and procedure is simple: "Living-with-sponsor" dependents are required to apply for needed care to a service hospital; if care cannot be provided, a permit will be issued which allows a dependent to receive care from civilian sources at government expense, if the needed care is authorized. This last phrase needs to be emphasized.

Since permits must often be issued by clerical personnel or by nonmedical officers commanding detached units without ready access to a service

hospital, a permit is not a blanket authorization for care at government expense; it is a document which allows a dependent to seek civilian care, but only that care which is authorized may be billed under Medicare. The civilian physician consulted is the one who determines if the care required is authorized under existing regulations. In effect, this procedure is a device that comes as close as possible to guaranteeing optimum utilization of service hospitals. Basically, the permit system for those dependents who are living with a sponsor assigns primary responsibility for care to service hospitals, with civilian facilities handling the overflow.

Shifting Patterns of Care

The restrictions on types of care for which payment may be made, and the permit system, were adopted to reduce costs and to further insure optimum use of service hospitals. The universe of dependents, the over 3 million women and children to whom these regulations primarily apply, is not a static universe. Both "separated-from-sponsor" and "living-with-sponsor" groups have a constantly changing membership. For many reasons families do not remain either together or apart for predictable periods of time. For example, a man is transferred and his wife remains behind to hold a job, to have a baby, to see the children through school, or to take care of sick parents. Perhaps there is no housing at the new post, and then housing becomes available; or perhaps the husband is on sea duty or temporary duty. Then conditions change and family groups re-form or temporarily break up, and "separated-from-sponsor" dependents become "living-with-sponsor" dependents.

When we consider everything together—the changing universe of dependents with their changing locations and eligibility, the need to keep our costs down, and the need to keep service hospitals operating at optimum capacity—the complexities of the program begin to become apparent. It is in this kaleidoscopic context that we do our job.

May I call attention to the changes which present an almost insuperable obstacle to operating the Medicare program on conventional health insurance lines? From the vantage point of hindsight, we are now able to see that these facts fall into a pattern. At the time, the program appeared to be an unpatterned, or unpredictably patterned, process. Now, we are able to see the process for what it was—primarily a redistribution of maternity cases from service to civilian hospitals and their partial replacement in service hospitals by an influx of medical and surgical, mostly pediatric, cases. The most important reason for not seeing the over-all pattern earlier was the problem of the lag in billings. It is in this context of change that the program operates.

The Future

As to the future, we know that the restrictions on the program have reduced the total volume of care. What we do not yet know is the extent to which the service hospitals will be able to take over and do the job. We are watching the restrictions closely; as dependents, physicians, and hospitals learn to adapt to these changed conditions it may well be that we will eventually be able to restore some, perhaps all, of the care we have had to cut out of the program. Our goal is to give the maximum care that the law and our funds allow. It is our hope that events will work out so that the total amount of care given returns to a proper level. If we all work together, I think we can at least come close to reaching that goal. Eventually, we hope to stabilize the program by return of certain types of care previously authorized so that it will become a permanent feature of service life. If we do that, Medicare should prove to be one of the major foundation stones of that high morale which is the indispensable condition of freedom.

INTESTINAL MOTILITY AND THE FORMATION OF ADHESIONS.—With the use of a method of producing measured, similar trauma to the peritoneal surface of the small intestine in dogs, adhesions were formed after 14 days in 7 of 10 so treated. Filmy to medium strength adhesions involving one-third to two-thirds of the segment prevailed in the control group. When, in addition, intestinal contraction was stimulated by the administration of prostigmin, adhesions were observed in only 3 of the 11 so treated. Only one of these had adhesions of medium density and the segment in these 3 dogs was from one-third to two-thirds involved. When, however, atropine was administered in addition to the measured trauma, adhesions were observed in all 10 animals so treated. All but one of these dogs had adhesions of at least medium density and 7 of them had involvement of more than two-thirds of the segment. By inference, then, the use of drugs which inhibit peristaltic activity is undesirable following laparotomy, and paralytic ileus due to any cause may be presumed to enhance the persistence of intraperitoneal adhesions.—D. F. Cone, The Effect of Intestinal Motility on the Formation of Adhesions, *Bulleting of the Johns Hopkins Hospital*, July, 1959.

RADIOISOTOPIC STUDY OF EFFECTS OF IRRIGATING FLUID IN TRANSURETHRAL PROSTATECTOMY

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and
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The amount of water that enters the blood stream as a result of irrigating the bladder during transurethral prostatectomy was determined in 11 patients. The extent of hemolysis was measured in nine and the volume of blood lost was measured in six patients. The determinations were made possible by measurements of radioactivity with Cr^{51} and I^{131} used as tracers. The average blood loss in two patients with cancer and four with benign hypertrophy was less than 280 cc. The water absorbed into the blood stream in 10 cases of benign hypertrophy averaged 237 cc.; in an 11th case the operation was unusually prolonged and the volume absorbed was 1,780 cc. The amount of hemolysis was equivalent to from 0 to 44 cc. of blood in eight cases in which distilled water was used as the irrigant; there was no hemolysis in the one case in which the irrigant was a solution isotonic with blood. Distilled water therefore appeared satisfactory as an irrigant under these conditions when the operation was not prolonged and the hydrostatic pressure was kept minimal.

Transurethral prostatectomy requires the use of an irrigating fluid to distend the prostatic urethra and to wash blood and dissected tissue away from the operative site. If bleeding is allowed to become active and profuse, a high head of pressure will be required to enable the operator to have adequate vision. Opened venous sinuses provide a channel for irrigating fluid to escape into the vascular system. For the most part the volume of fluid absorbed will depend on the hydrostatic pressure, the number and size of the venous sinuses opened, and the time of exposure.

It is recognized that the entrance of irrigating fluid into the vascular system has, in the main, two adverse reactions. If sterile water is used as the irrigant, hemolysis will result.[1] If a large volume of irrigating fluid enters the vascular compartment, cardiac decompensation may occur.

Hemolysis can be avoided by the addition of a substance such as glycine to water to render it iso-osmotic and nonhemolytic. The role of hemolysis in the pathological physiology of acute tubular necrosis is unknown. Creevy [2] feels that hemoglobinemia of high concentration bears a direct relationship to the development of acute tubular necrosis. It is recognized that other important factors are shock, hypotension, hemorrhage, bacteremia, preexisting kidney damage, extravasation, and excessive fulguration.[3] Creevy [4] reports that the use of an iso-osmotic irrigating solution has reduced the mortality of transurethral resection from 1.29 to 0.6%.

The danger of overhydration has been recognized in recent years.[5] Many patients with prostatism have serious arteriosclerotic heart disease and cannot tolerate rapid changes in vascular volume. The condition of these patients presents a major problem of management. The question arose as to how much irrigating fluid is absorbed into the vascular system during a carefully performed transurethral resection, with use of a low hydrostatic fluid pressure and dissection only to the superficial fibers of the surgical capsule. Previous studies with use of radioisotopes indicated that as much as 3.5 to 4 liters of irrigating fluid may be absorbed in some cases.[6] The absorption of a volume of fluid of this magnitude would appear to be hazardous in many cases.

Radioisotopes afford a means of labeling both irrigating fluid and red blood cells for determination of fluid absorption and hemolysis respectively. Griffin,[6a] using radioisotopes as a labeling agent in the irrigating fluid, reported as much as 4 liters of absorption. Taylor [6b] and associates, using a variation of this method, estimated that as much as 3,400 ml. of fluid may be absorbed into the vascular system during resection. One of their patients died from pulmonary edema after absorption of 2,900 ml.

Thus, while quantitative determination of hemoglobinemia has previously been made during transurethral resections with use of sterile water as the irrigant,[7] hemolysis has not been measured before by means of radioisotopes. One of us (L. O. G.) has now devised a technique of measuring hemolysis quantitatively with use of radioisotopes.

Purpose of Study

The purpose of this investigation was to measure fluid absorption, hemolysis, and blood loss in the ordinary transurethral prostatectomy in which a low irrigating pressure is used and the dissection is limited to the superficial fibers of the surgical capsule. In most cases the larger venous sinuses are not encountered, as they lie deeper, near the true capsule. The primary object was to determine whether irrigating fluid would be absorbed in

From the Santa Fe Hospital.

amounts sufficient to be expected to cause cardiac strain. Secondary objectives were to determine how much hemolysis occurs with the use of sterile distilled water as the irrigant, and to measure blood loss during the operation.

Subjects and Procedures

The subjects of our study were patients with prostatism selected as candidates for transurethral prostatectomy at the Santa Fe Hospital, Topeka, Kan. Fluid absorption was measured in 11 patients, hemolysis determined in 9 patients, and loss of blood measured in 6 patients.

The operating procedure was identical in all cases. General anesthesia was used, consisting primarily of thiopental (Pentothal) sodium and succinylcholine chloride. The irrigating fluid was measured into an 8,000-ml. percolator. The hydrostatic pressure ranged from 40 to 75 cm. above the pubis. The bladder was emptied frequently to avoid overdistention. The number of liters of water used ranged from 7.5 to 18 liters, with an average of approximately 11 liters. In the 11 cases in which fluid absorption was measured, a solution of a concentrated, nonhemolytic urologic irrigating fluid, Cytal solution, was added to create a nonhemolyzing solution. (Each 100 cc. of Cytal, when diluted with 9 parts distilled water, contains sorbitol, 2.70 Gm.; mannitol, 0.54 Gm.; methyl parahydroxybenzoate, 0.5 mg.; propyl parahydroxybenzoate, 0.1 mg.; and butyl parahydroxybenzoate, 0.1 mg.) Sterile distilled water was used when hemolysis was measured, with the exception of one test case in which a nonhemolyzing solution was used as the irrigant.

Fulguration was employed minimally. The dissection of the adenoma was stopped at the fibers of the surgical capsule. The venous sinuses lying deeper in the capsule were rarely encountered. Operating time measured generally 60 minutes or less, with few exceptions. A 24 French Foley-Alcock catheter was used for continuous postoperative drainage. The bladder was not irrigated postoperatively. No complications developed in this series of patients.

Materials and Methods

The materials used in this study were radioiodinated (I^{131}) serum albumin (human) (Risa) and sodium radio-chromate (Cr^{51}) (Rachromate). Absorption of irrigation fluid was determined by mixing the radioactive material with the irrigant and comparing the total radioactivity in the circulating blood at the end of the operation with the radioactivity in a given volume of the irrigant. Radioiodinated (I^{131}) serum albumin (human) was used in 6, and sodium radio-chromate (Cr^{51}) in 5 of the 11 cases.

Hemolysis was measured by tagging the red blood cells with sodium radio-chromate (Cr^{51}) and comparing the total gain in radioactivity in the circulating plasma during the operation with the radioactivity in a given volume of packed red blood cells. The blood volume and hematocrit of each patient was measured.

Method for Determination of Fluid Absorption.—From 25 to 40 μc of radio-iodinated human serum albumin was added to about 16 liters of Cytal solution. The activity in the irrigant was determined by counting 4-ml. specimens in duplicate. Some difficulty was encountered because the pH of the distilled water used approached the isoelectric point of serum albumin, resulting in an uneven distribution of the radio-iodinated serum albumin in the irrigant. At about 20-minute intervals during the operation, 4-ml. blood specimens were drawn and the radioactivity determined. The blood volume was measured after surgery, also with use of radio-iodinated serum albumin. The volume of irrigation solution absorbed, in milliliters, was computed by dividing the total radioactivity absorbed in the blood by radioactivity per milliliter of irrigant.

Method for Determination of Hemolysis.—Approximately 40 ml. of blood was withdrawn from the patient and injected into a sterile, silicone-treated bottle containing 10 ml. of special formula A. C. D. solution. From 50 to 200 μc of sodium radio-chromate (Cr^{51}) was added. Ascorbic acid, 50 to 100 mg. was added to stop the tagging of the red blood cells and to tag the plasma for blood volume determination. In order to obtain reasonable tagging of the plasma, it was necessary to add the vitamin in less than one minute. All but 12 to 15 ml. was withdrawn into a sterile syringe, weighed, and injected into an antecubital vein. The remaining blood was used to determine the hematocrit of the injected blood and to prepare a whole blood and a plasma standard. The red blood cell volume and plasma volume were calculated from the hematocrit and from the radioactivities in 15-minute specimens of whole blood and plasma and in the standards.

The operation was performed six or seven days later, when plasma activity was nearly negligible. Pure distilled water was used as the irrigant. Blood specimens were taken at about 20-minute intervals during the operation and immediately thereafter.

Measurement of hemolysis requires that the activity per unit volume of packed red blood cells be determined. This activity compared with the total increase in activity in the plasma gives a measurement of cells hemolyzed.

Determination of the radioactivity per unit volume of packed red blood cells cannot be done directly, because the volume of red blood cells counted cannot be accurately measured. Red blood cells cannot be entirely freed from plasma and they stick to the surface of volumetric glassware.

With Kaplan's indirect method [8] the activity per unit volume of packed red blood cells can be simply and accurately determined by use of the micro-hematocrit of the whole blood specimen, 4 ml. of hemolyzed whole blood, and 4 ml. of clear plasma. The whole blood is thoroughly mixed, and 4 ml. is measured into a plastic counting test tube with a

volumetric pipet and hemolyzed by setting the test tube in water at about 70 C for two or three minutes. Thorough mixing of the whole blood is essential for accurate measurement of the microhematocrit. Two capillary tubes are used and the results averaged. After centrifuging the remaining blood, a 4-ml. aliquot of clear plasma is measured with a volumetric pipet, as before.

That part of the net counts per minute in the whole blood due to plasma in the specimen is equal to the net counts per minute in the 4-ml. specimen of clear plasma times the difference between one and the microhematocrit, called the plasmacrit. The volume of red blood cells in the 4-ml. specimen of whole blood is equal to the microhematocrit times 4 ml. The net counts per minute in this volume of red blood cells are equal to the net counts per minute of the whole blood specimen, less the net counts per minute due to the plasma in the specimen. Dividing by the volume of red blood cells gives the activity per milliliter of packed red blood cells. The equation for the above is as follows:

$$R_c = \frac{R_w - R_p(1 - H_c)}{4 \times H_c}$$

where R_c = net counting rate per milliliter of packed red blood cells
R_w = net counting rate of a 4-ml. sample of whole blood
R_p = net counting rate of a 4-ml. sample of clear plasma
H_c = microhematocrit

The determination of total hemolysis caused by sterile distilled water during the operation depends on the determination of plasma volume and the tagging of red blood cells with a radioisotope. Sodium radio-chromate (Cr^{51}) was used to simultaneously tag the red blood cells and measure the plasma volume, either directly by tagging the plasma or indirectly by using the venous hematocrit, with either the whole blood volume or the red blood cell volume. Tagging the plasma yields accurate results, but several days must elapse between the plasma volume determination and the operation, in order that the plasma activity may be eliminated. Thus, change in plasma volume may occur before the time of surgery.

Determination of Blood Loss.—A logical method for simultaneous determination of absorption and blood loss was tried. The irrigant is either absorbed or excreted. The total fluid excreted is composed of blood lost, a very small amount of urine, and the excreted irrigant. The ratio of the radioactivity per unit volume of the fluid excreted to that of the irrigant, times the total volume excreted, gives the volume of irrigant in the excreted fluid. Subtraction of this volume from the volume of irrigant gives the absorption, and from the total fluid excreted gives the volume of blood and urine excreted.

Collection of all of the excreted fluid was a problem. A rubber sheet was used to funnel the fluid into the collecting tray, from which the fluid flowed into a carboy. Estimates of loss of this fluid, such as on the surgeon's gown, ranged from 30 to 200 ml. The average blood loss by six patients (table 2) was less than 280 ml. as determined by a direct isotopic dilution technique. Because the error in determining the excreted volume was approximately of the same order as the blood loss and irrigant absorption, the simultaneous volume technique was abandoned.

Blood loss during the operation was determined in six out of nine cases by collecting the excreted fluid of patients whose red blood cells had been tagged with sodium radio-chromate (Cr^{51}) several days before the operation, determining the total radioactivity of the fluid, dividing by the activity per milliliter of red blood cells, and dividing the result by the hematocrit of the patient during the operation (table 2). In this method, errors in measuring the volume of the excreted fluid are relatively unimportant. They are proportional to the ratio of the volume error to the total volume of fluid excreted.

Of considerable importance is the error in the hematocrit. Venous hematocrits were determined. Whole body hematocrits are known to average about 91 or 92% of the venous hematocrit [9] and may range from about 80 to 100%. It seems probable, therefore, that the blood losses reported in table 2 are at least 10% too low. However, the volume of packed red blood cells lost can be quite accurately determined.

A possible source of error is the comparatively rapid elimination of sodium radio-chromate (Cr^{51}) from the plasma. This may be important in two ways. First, we did not take multiple blood specimens and extrapolate back to determine the plasma activity at zero time, as recommended by Kaplan.[8] This would tend to make our plasma volume determinations too high. Second, a significant part of the activity released into the plasma by hemolysis may have been removed from the circulation by the liver and kidneys before the operation was completed. This would tend to make our plasma activity measurement too low. Fortunately, these effects tend to balance each other in the hemolysis determination.

Radio-iodinated serum albumin appears to be removed from the circulating plasma, but at a lower rate. In a supplementary investigation, three patients in whom a loss of about 10% of the circulating radio-iodinated serum albumin occurred were observed for two hours. This would tend to make our absorption measurements too low.

Data

Fluid Absorption.—In 7 of the 11 cases investigated, intravascular fluid absorption measured less than 110 ml. (table 1). Significant fluid absorption occurred in one case. In case 5, in which the operating time was extended to 90 minutes, 1,780 ml. was absorbed. In this case, venous sinuses were opened. Discounting this case, the over-all average absorption per case measured 237 ml.

Hemolysis.—Pure distilled water was used as the irrigation solution in eight cases (table 2). In the ninth case a Cytal solution was used. Hemolysis was measured as milliliters of packed red blood cells hemolyzed. This was also expressed as the percentage of the total red blood cell volume hemolyzed. The average volume of packed red blood cells hemolyzed measured 11 ml., with a range from 0 to 44 ml. Hemolysis did not occur in one case in which sterile water was used as the irrigating solution. This was a 7-Gm. resection for carcinoma. In the test case (case 20) in which a nonhemolyzing irrigating solution was used, hemolysis could not be detected, although 40 Gm. of tissue had been resected and the operation required 70 minutes.

TABLE 1.—*Radioisotopic Determination of Irrigating Fluid Absorption in Transurethral Prostatectomy**

Case No.	Weight of Tissue Resected, Gm.	Time of Resection, Min.	Blood Volume, Ml.	Radioactivity of Irrigant, Counts/Min./Ml.	Radioactivity of Blood Sample, Postoperative, Counts/Min./Ml.	Volume of Irrigant Absorbed, Ml.
1.....	33	45	5,950	1,349	19.0	84
2.....	22	60	4,050	2,722	239	353
3.....	11	50	5,120	2,722	54.8	103
4.....	11	40	5,500	1,777	34.5	106
5.....	32	90	5,300	791	263	1,780
6.....	41	70	5,380	706	39.3†	299
7.....	9	30	6,810	465	2.75	40
8.....	21	45	5,690	584	0	0
9.....	15	45	5,510	592	132	1,230
10.....	23	45	5,960	681	5.5	48
11.....	30	45	5,080	608	12.3	103

* In cases 1 through 6 the irrigant was labeled with radio-iodinated (I^{131}) serum albumin (human) 40μc, and in cases 7 through 11 with sodium radio-chromate (Cr^{51}). In all cases the pathological condition was benign prostatic hypertrophy.
† Maximum activity occurred before end of surgery.

The standard recommended operative technique for transurethral prostatectomy was followed. The measures employed in this procedure to limit fluid absorption include the use of a low hydrostatic fluid pressure, frequent emptying of the bladder, restriction of operating time to approximately 60 minutes, and limiting dissection to the superficial fibers of the surgical capsule of the prostate.

The primary objective of the study was to determine whether sufficient fluid is absorbed under these conditions to strain a weakened myocardium. Secondary objectives of this investigation were the quantitative determination of hemolysis resulting from the use of sterile distilled water as the irrigant, and measurement of blood loss.

Only one patient showed what would appear to be excessive absorption. In this case, 1,780 ml. of fluid was absorbed. It should be noted that in this case the operating time was prolonged to 90 minutes, and the operator felt that venous sinuses had been opened. The patient exhibited no untoward reaction, such as elevated blood pressure, or other effect. In general, fluid absorption was considerably less than one liter, an amount which would appear to be without clinical significance.

Hemolysis was measured by tagging red blood cells with sodium radio-chromate (Cr^{51}) and measuring the total increase in radioactivity of the plasma during surgery. Hemolysis was measured as milliliters of packed red blood cells hemolyzed, and expressed as the percentage of the total red blood cell volume hemolyzed. The largest volume of red blood cells hemolyzed measured 44 ml., in a patient who exhibited no ill-effects. In the other cases the volume of redblood cells hemolyzed measured less than 16 ml. Hemoglobinemia secondary to the hemolysis of this small volume of red blood cells would appear to be of no clinical significance.

TABLE 2.—*Radioisotopic Determination of Hemolysis and Blood Loss During Transurethral Prostatectomy*

Case No.	Pathology	Cr^{51} to Tag Cells, μc	Weight of Tissue Resected, Gm.	Time of Resection, Min.	RBC Volume, Ml.	Plasma Volume, Ml.	Gain in Plasma Radioactivity, Counts/Min./Ml.	Av. RBC Radioactivity, Counts/Min./Ml.	Packed RBC's Hemolyzed, Ml.	Total RBC Volume, Hemolyzed, %	Blood Loss, Ml.
12	Benign prostatic hypertrophy ..	200	33	45	1,950	2,090	29.0	7,238	10.8	0.55	345
13	Cancer	100	15	45	1,560	2,110	7.75	4,802	3.4	0.22	262
14	Benign prostatic hypertrophy ..	200	9	55	1,765*	2,015*	3.83	7,902	0.98*	0.055*	86
15	Benign prostatic hypertrophy ..	100	29	60	2,195	2,855	4.25	3,797	3.2	0.15	396
16	Benign prostatic hypertrophy ..	100	25	50	2,290†	2,910†	13.0	3,840†	9.9†	0.43†	521
17	Cancer	100	7	60	2,160	2,570	0.0	1,787	0.0	0.0	55
18	Benign prostatic hypertrophy ..	50	9	25	2,415	2,880	3.4	629	15.6	0.65	...§
19	Benign prostatic hypertrophy ..	50	29	55	2,255‡	2,875‡	5.2	339‡	44‡	1.95‡	...§
20‖	Benign prostatic hypertrophy ..	50	40	70	...§	...§	0.0	919	0.0	0.0	...§

* Blood volume 3,780 ml. Hematocrit in question.
† Hematocrit 44.0%. Blood volume determination inaccurate. Theoretical blood volume used.
‡ Hematocrit 44.0%. Doubtful that all of tagged cells were reinjected into lumen of antecubital vein. Theoretical blood volume used.
§ Not determined.
‖ Cytal, nonhemolytic irrigant. Pure distilled water used for other cases.

Comment

Radioisotopes were used as a labeling agent in 11 cases to measure fluid absorption, in 9 cases to measure hemolysis, and in 6 cases to measure bleeding during transurethral resection of the prostate.

Bleeding was measured in six cases by determining the total radioactivity in the excreted fluid of patients whose red blood cells had been tagged with sodium radio-chromate (Cr^{51}), and dividing by the product of the hematocrit and the activity per milliliter of red blood cells. Blood losses ranged from 55 to 521 ml. and averaged less than 280 ml.

This study suggests that fluid absorption is not excessive during transurethral resection of the prostate if a low hydrostatic fluid pressure is used

throughout and the dissection is not carried into the venous sinuses lying deep in the surgical capsule.

The study of hemolysis would indicate that sterile distilled water is a safe irrigating medium if used properly. One of us (E. M. F.) does not feel that an iso-osmotic solution adds to the difficulty of resection. It has a great added advantage in reducing toxicity in the event of perforation of the surgical capsule.

109 W. Ninth St. (Dr. Fillman).

The A. C. D. solution used in this study was a special formula supplied by Abbott Laboratories, North Chicago, Ill. The radio-iodinated (I^{131}) serum albumin (human) and the sodium radio-chromate (Cr^{51}) were supplied as Risa and Rachromate, respectively, by Abbott Laboratories.

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V. 1

TREATMENT OF CHRONIC ALCOHOLISM BY HYPNOTIC AVERSION

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Hypnosis has been used in 24 patients with chronic alcoholism to create an aversion to alcoholic drinks. The duration of the alcoholism ranged from 3 to 34 years, and the patients were made to relive the unpleasant hang-over effects of alcohol in the hypnotic trance. During the follow-up period, which averaged nine months, four patients relapsed, one of whom has so far responded well to additional treatment. Three case histories illustrate the favorable results obtained in two men aged 45 and 53 and a woman aged 56.

For some time I have been experimenting with various methods in an attempt to create a lasting aversion to alcoholic spirits by means of hypnosis. Since the smell and taste of whiskey, beer, and wine are generally pleasurable to the alcoholic, I felt that it was necessary to attempt to create an aversion to the taste, smell, and thought of alcoholic beverages and, furthermore, that if the generally pleasant anticipatory reaction of the alcoholic to alcoholic beverages could be altered to one of disgust and displeasure, it would discourage any primary desire for drink. In my initial attempts, I found that the aversion reactions could be intensified by having patients relive the unpleasant "hang-over" effects of alcohol in the hypnotic trance.

The basic rationale was that of Freud's pleasure principle and the efforts of the unconscious mind to evade or avoid reliving a painful, disgusting, or disagreeable experience. Pavlov [1] had demonstrated how conditioned reflexes could be established and how reactivity could be so intensified that a light stimulus would produce a marked response. It was known that the phenomenon of hypnosis resembles a conditioned response in that the subject becomes increasingly susceptible to hypnotic induction (phenomenon of "dressage"). Thus, it appeared similarly possible to "sensitize" and accelerate reflex response by means of hypnosis.

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Even a slight whiff or taste of alcoholic beverages might be sufficient to evoke a conditioned aversion reaction.

Attempts along this line on the conscious level have been made by other investigators in the so-called conditioned reflex aversion treatment of alcoholics, by Voegtlin [2] and LeMere and co-workers.[3] In these instances the subjects were given alcoholic spirits after a nauseant and an emetic drug, generally emetine hydrochloride, had been administered. The result was that the patient would become nauseated and vomit the ingested alcohol. The purpose was to create an aversion, based on taste and smell, to alcoholic beverages. This was repeated for a number of treatments until the therapist was satisfied that the patient had an aversion to alcohol. I should like to comment briefly on this mode of treatment. Dercum [4] deprecated the use of such depressant and nauseant drugs as emetine and apomorphine in the treatment of alcoholism, considering the treatment as possibly harmful and of little lasting benefit. Certainly the treatment is not without its dangers and is, because of its duration, a painful experience for the patient. No doubt there has been some success with this method, although longer follow-up data on results obtained have been difficult to secure. The one important drawback in the treatment is that the patient is usually aware that he is being given an injection of a nauseant drug when the spirits are administered. If we are to assume that the patient associates the vomiting with taking the whiskey, why could it not just as readily be assumed that he is as likely, if not more likely, to associate the vomiting with the injection? Illustrative of this type of reaction was a 32-year-old alcoholic woman whom I encountered some years ago at the Cleveland House of Correction. She had just completed a "wonder cure" at the Greenhill Institute there. It appeared that her husband had mortgaged the family car so that she could have the treatment. When I asked her why she had begun to drink again, after her husband had made such a sacrifice to have her treated, she remarked, "But, doctor, after they made me puke for three days and three nights, I just had to have some whiskey to settle my stomach."

With reference to the use of disulfiram (Antabuse)[5] one must also be aware of certain problems. There are persons who may present a toxic sensitivity to the drug. Undesirable side-effects such as drowsiness, mild grand mal convulsions, gastrointestinal complaints, fatigue, headache, dizziness, and diminished sexual potency have been reported.[6] The treatment is generally contraindicated in the presence of diabetes, renal disorders, liver diseases, and epilepsy. It is particularly hazardous to cardiac and hypotensive patients who drink while taking disulfiram. There have been instances when compulsive, self-destructive, suicidal drinkers have consumed alcoholic spirits while under the influence of disulfiram and suffered severe reactions, as would be anticipated. In some instances such reactions could be fatal.

Many alcoholics will take disulfiram for a brief period and discontinue its use whenever they feel a desire to go on another drinking spree. The principal deterrent to the use of disulfiram is the fear that it engenders in the patient. Frequently, patients taking disulfiram may demonstrate a prevailing tension or manifest anxiety concerning the possible consequences, should they yield to the desire to drink.

My decision to experiment with hypnosis in attempting to create an aversion was based on a number of considerations. First and foremost, I felt that one of the greatest weaknesses of the aforementioned treatment was that it was on a conscious level. It appeared likely that the aversion and disgust reaction could be prolonged and intensified if a conditioned-reflex reaction could be established in the unconscious mind of the patient and, furthermore, that in order for this aversion to persist it had to be established beyond the reach of conscious resistances and ego defenses. In addition, it was desirable to avoid the use of possibly dangerous nauseant and depressant drugs. The advisability of submitting patients who are often seriously nutritionally depleted to daily emesis for 7 to 10 days can frankly be questioned. It was also apparent that, if successful, the hypnotically induced reflex aversion could be established much more rapidly and effectively, without causing the patient as much discomfort and dread of the treatment.

It was felt that the aversion reaction could be made more intense and lasting to the patient because of the greatly increased state of affectivity under hypnosis. It appears preferable for all concerned to be able to create a disgust aversion reflex reaction in a painless manner, so that the patient experiences a lack of appetite and desire for alcoholic beverages. Obviously, such a patient will not consume alcoholic beverages if he derives no pleasure from them and actually finds that the smell, taste, and sight of alcohol upset him physically and emotionally. Finally, such a treatment could be easily given on an outpatient basis and would not require the hospitalization of the person and the loss of time and expense involved.

Evaluation of Results

This is merely a preliminary report and covers a relatively small group of patients. Most of these patients were seen at the Howard University neuropsychiatric clinic, the remainder at my office. Of the 24 patients treated thus far, 5 were women. The duration of their alcoholism ranged from 3 to 34 years. The average time of follow-up has been nine months. Eighteen of these patients are continuing psychotherapy. The average number of treatments received was two, but in some instances a third or fourth treatment was given if indicated. Eight

attend Alcoholics Anonymous meetings. Of the total, three patients have relapsed thus far. The criterion employed was that of continued abstinence from alcoholic beverages. About half of the patients made attempts to test themselves with alcohol, and all of these developed prompt aversion reactions and discontinued further such attempts. One of the patients attempted to drink beer after an aversion to whiskey only had been initiated. One first switched to barbiturates and then became intoxicated after the ingestion of larger doses of barbiturates. The third patient was disturbed, with a marked tendency toward depression.

No claims are being made for this treatment as a cure-all for alcoholism. It represents only a procedure for attempting to control drinking so that constructive psychotherapeutic, social, and economic rehabilitative steps can be taken. Alcoholism is symptomatic of deeper underlying disturbances of the personality, and there are probably as many diverse causes for alcoholism as exist for human unhappiness.

Procedure

In most instances I have found it sufficient to follow the initial treatment with a second aversion treatment a week later. Further treatment is usually unnecessary unless indicated by a tendency on the part of the patient to relapse. After the initial treatment patients may often test themselves with alcoholic beverages. If properly conditioned under hypnosis, they will promptly become nauseated and frequently vomit any ingested spirits. If the patient is in a poor nutritional state or in need of medical care or hospitalization, posthypnotic suggestion can be used to advantage to facilitate his cooperation in remedial measures. It is advisable to use posthypnotic suggestion further and influence the patient against the use of sedative drugs and tranquilizers as a substitute for the alcohol. The dangers of this practice should be strongly stressed. Alcoholics are particularly apt to develop dependency on habit-forming sedative drugs, since they are generally suffering from marked inner anxieties and guilt. As aforementioned, psychotherapeutic measures should be strongly encouraged at this point and posthypnotic suggestion utilized toward attaining this goal, since the underlying personality and character problems have not been resolved.

The hypnoreflex aversion treatment presents certain other advantages. It is completely harmless in the hands of a properly trained psychotherapist. Furthermore, since it is administered under hypnosis, it is possible to keep the patient consciously relatively unaware of any painful or disagreeable nauseating or vomiting experiences. This treatment can easily be administered to ambulant patients and does not require hospitalization. Since the aversion is created at an unconscious level, it is more intense and lasting. In addition, it provides the opportunity, while the patient is in the hypnotic trance, to explore some of the principal problems and conflicts which may underly his alcoholism and to permit him to abreact his emotional tensions. It also affords the opportunity to influence the patient to pursue a constructive medical, social, and psychotherapeutic regimen [7] by the skillful employment of posthypnotic suggestion. It is often possible to better evaluate the patient's problems with regard to whether he should undergo individual or group psychotherapy. Also, under hypnosis, the patient can relive his most disagreeable "hang-over" experiences intrapsychically, without having to ingest alcohol or nauseant drugs.

As aforementioned, the hypnotic reflex aversion treatment is far more effective because the aversion is created while the subject is unconscious and cannot employ his ego defenses or resistances. There is a stronger affective component in the latter instance, because affectivity is markedly increased while intellectualization is markedly diminished under hypnosis. The discussed aversion reaction is therefore felt by the patient with greater intensity. Furthermore, because of hypnotic amnesia, he is unable to link or correlate the aversion reaction with any administration of a medicament to induce it. In most instances, I simply intensify the disgust, aversion, and displeasure of the hang-over state by having the subject actually relive one of his worst hang-overs.

It is important, as indicated earlier, to create, if possible, an aversion reaction to all types of spirits, including beer and wine, since I have seen instances in which a patient was given an aversion treatment to whiskey only and then attempted to switch to beer or wine in order to satisfy his craving. During the trance, it is also advisable to stress the dangers of switching the dependency to sedative drugs, such as barbiturates and tranquilizers, while on the other hand stressing constructive measures.

It is further evident that this treatment should be conducted by a psychotherapist who is well trained in hypnosis. Hypnotherapy is a method that requires adequate comprehension of the dynamics of the unconscious mind. Much harm can be done by its misuse, and it must be used only with specific medical indication, never indiscriminately.

Treatment is first explained to the patient as harmless, and no attempt is made to force the patient to undergo it. Cooperation should be on a completely voluntary basis.

I have found that aversion reactions by means of hypnosis can be successfully induced in the treatment of such conditions as obesity (aversion to specific foods), compulsive cigarette smoking, and certain instances of drug addiction. This technique has been effective in treating obesity in diabetic patients.

Summary of Cases

Case 1.—A 45-year-old man became an alcoholic at about 20 years of age. He began drinking at the age of 16 years. His drinking followed a compulsive pattern, and after severe bouts he would become

depressed. During such postalcoholic depression states he twice attempted suicide, once by hanging himself with a belt. The patient gave a typical picture of latent repressed homosexuality; homosexual men particularly tended to disturb him greatly. He suffered from partial impotence and had strong feelings of inferiority, guilt, and self-condemnation, particularly manifest during his hang-overs and brief intervals of abstinence.

He felt that alcohol relieved his tension and made him feel more masculine and less aware of the effeminate component in himself. When drinking, he would release his pent-up self-hate on others, acting hostile, becoming enraged at the slightest provocation, and being disagreeable and negativistic. He described his alcoholism as a "crutch" on which he could always lean when he felt bad: "I would just wipe out reality for about two weeks."

My endogenic method of hypnotic relaxation [8] was employed, and the patient was in a deep trance within three minutes. He was then made to relive his worst hang-over, including the malaise, headache, nausea, and vomiting. He began emesis in four minutes after strong suggestions were given, while at the same time he was permitted to smell and taste whiskey, wine, and beer.

He was given specific suggestion that, whenever he tasted, smelled, or even looked at alcoholic beverages, he would begin to recall these horrible hang-over symptoms. This patient has been abstinent for 12 months at the time of writing. He states that he cannot anticipate any pleasure at the taste, smell, sight, or even thought of alcoholic beverages. During this period he has been treated by group psychotherapy twice weekly, and he is making excellent progress in resolving his basic difficulties.

CASE 2.—A 56-year-old woman had been a chronic alcoholic since her husband's death eight years earlier. Prior to that, she stated, she had drunk only socially and had never experienced alcoholic intoxication.

The patient stated that she felt a compulsion to drink, even though at times she had desired to abstain but was unable to do so. She was relaxed by the endogenic method within four minutes and then given aversion conditioning treatments similar to those given in the previous case. This patient did not have an emesis but felt very nauseated.

She has been completely abstinent for 11 months at the time of writing. She has complete aversion to the taste and smell of alcoholic beverages. These not only evoke a disagreeable nauseous feeling rapidly but also are promptly associated by the patient with disagreeable "hang-over" feelings.

CASE 3.—A 53-year-old man had been affiliated with Alcoholics Anonymous for eight years but was unable to curb his drinking. He had been drinking excessively for approximately 30 years. Under hypnosis he revealed that he had suffered from severe feelings of inadequacy as a man and that alcohol made him feel more "manly." The patient revealed further that he was a minister's son and had been reared very rigidly. Sexual matters were never discussed at home and the patient had always been held up as a model boy for the congregation. He was constantly plagued by shame and guilt feelings. After puberty he became preoccupied with perverse and infantile sexual impulses and fantasies. He always felt guilty about these, and later in life he discovered that he could derive considerable relief for his guilt through drinking. His drinking bouts were followed by strong secondary guilt feelings, depression, and physical illness. This patient was given an aversion treatment under hypnosis. Two days after this, while under considerable mental tension, he went into a bar and ordered 2 oz. of vodka with orange juice. After ingesting this drink he became nauseated and had an emesis. He was given a second aversion treatment on the next day, and he has remained completely abstinent for nine months at the time of writing. Intensive psychotherapy was instituted in order to deal with his deep-seated neurotic problems. His guilt and anxiety feelings have greatly diminished, while his insight into his problems is greatly improved. He has been able to remain in his job, which is a position of responsibility. He also reports that his marital life generally has improved.

2025 Eye St., N. W. (6).

Addendum

Since this paper was submitted one additional alcoholic patient who received aversion treatment by hypnosis has relapsed. This patient received another aversion treatment after the relapse and has been abstinent for one month.

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EFFECTS OF CHLORPROMAZINE AND ALCOHOL ON COORDINATION AND JUDGMENT

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This study was designed to test the belief that simultaneous use of tranquilizing drugs and alcoholic drinks has a particularly bad effect on neuromuscular coordination and interferes with safety in automobile driving. A battery of tests was applied to 24 volunteer subjects under four experimental conditions achieved with combinations of alcohol and chlorpromazine, alcohol and placebo tablet, placebo drink and chlorpromazine, and placebo drink and placebo tablet. The effect of alcohol and chlorpromazine taken together significantly impaired the performance of the subjects. The more complex tasks were most affected, and the subjects became aware of dulness, lethargy, and poor coordination. Chlorpromazine alone impaired performance, but the impairment caused by alcohol with chlorpromazine was significantly greater. Patients obliged to take chlorpromazine should be warned that the use of alcohol greatly increases the dangers of operating complex machinery, including automobiles.

This experimental study resulted from an observation on the part of certain police officers that a combination of tranquilizing drug and alcohol appeared to interfere with safe automobile driving more than did alcohol alone. Interrogation of an alcoholic disclosed the fact that he noticed a greatly increased effect from whiskey after having first taken meprobamate. However, Marquis and co-workers [1] found no potentiating effect of meprobamate on alcohol. Since less than 1 oz. of alcohol was used in their study, and no effort was made to adjust alcohol concentration to body weight, it is not surprising that little effect was noted. Moreover, the authors did not state whether the subjects took the alcohol on an empty or a full stomach. If the subjects had recently taken food, the rate of absorption of the alcohol would have been slowed down and the alcohol blood volume would have been quite low at the end of the 30-minute waiting period allowed before the start of testing.

Greenhouse and Pilot [2] reported that alcoholic subjects treated with reserpine who continued to drink stated they received a more powerful effect from the alcohol. On the basis of animal studies showing a potentiating effect of chlorpromazine (Thorazine) hydrochloride on alcohol, its makers warn physicians to take particular care in administering it to patients who may have a considerable amount of alcohol in their systems. Fazekas and co-workers [3] questioned that there is a synergistic action between chlorpromazine and alcohol. A letter from Fazekas indicated, however, that he suspects that there is a potentiating effect of chlorpromazine on alcohol.

Chlorpromazine is being taken by large numbers of discharged mental patients today. Many of these patients operate automobiles or other complex machinery, and they have access to alcoholic beverages. If there is a potentiating effect of chlorpromazine on alcohol, solid evidence for it should be discovered so that effective control measures may be instituted. At Madison State Hospital by far the most common drug being taken by outpatients is chlorpromazine. A study of dosages over a year's time showed the most common one for outpatients to be 200 mg. per day. It was therefore decided to use this drug for the present study in the dosage of 200 mg. per day.

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Experimental Problem and Procedure

The experimental problem was defined in terms of the null hypothesis: There is no more effect on human coordination and judgment from a combined dosage of alcohol and chlorpromazine than from either of these drugs taken singly.

To answer this problem four experimental conditions were provided. These were (1) placebo condition ("chlorpromazine" placebo plus placebo drink), (2) chlorpromazine condition (chlorpromazine plus placebo drink), (3) alcohol condition ("chlorpromazine" placebo plus alcohol drink), and (4) chlorpromazine-alcohol condition (chlorpromazine plus alcohol drink). The four conditions were rotated in four different sequences. Subjects were divided into four subgroups of six, with each group being assigned a different sequence. Placebos, chlorpromazine, and alcohol were administered orally, a "blind" procedure being used.

To approximate the therapeutic situation it was decided to administer chlorpromazine to subjects for a week before its effects were tested. Its presence was verified by a urine test.[4] When administration was stopped, a week was allowed for it to be dissipated from the system before testing was resumed. Subjects took tablets on arising and retiring for the entire experimental period.

Ninety-five per cent ethyl alcohol was given to subjects, on empty stomachs, in combination with lemon-lime–flavored carbonated water, sugar, mint leaves, and ice. A placebo drink of the same without the alcohol was given on two of the test days. Some subjects knew from its smell, taste, and effects when the alcohol was present. Amounts of alcohol given were adjusted to body weights in order to produce a blood level close to 0.05%. Theoretically, 30 cc. of ethyl alcohol per 150 lb. (68.2 kg.) of body weight will produce this level. Individual variables affect the physiological action so that the theoretical level can seldom be exactly achieved, however. An extra 10 cc. of alcohol per 68 kg. (150 lb.) was given to compensate for the amount consumed by the body during the 45 minutes to an hour which elapsed before testing.

The 0.05% blood alcohol level was chosen because statutes in many states hold that this concentration does not impair driving ability. If chlorpromazine increased the action of this amount of alcohol to the point where the drinker's coordination and judgment were definitely impaired, then the supplementing or potentiating effect would be clearly demonstrated.

Subjects were allowed 15 minutes in which to drink the test beverage, and 45 minutes more were allowed for the desired concentration of alcohol to build up. They were then tested for blood alcohol volume by means of a Breathalyzer. This instrument operates on the principle that at body temperature the ratio between breath alcohol and blood alcohol is 2,100 to 1. Breath tests were made regardless of whether the subject had taken a drink containing alcohol. They were also made at the conclusion of the testing period on subjects who had taken alcohol.

Subjects.—Twenty-four subjects were enlisted for the experiment. Eighteen were employees at the hospital and six were patients. There were 18 men and 6 women, with ages ranging from 20 to 71 years. Most were in their 20's or 30's. Weights ranged from 105 to 210 lb. (48 to 96 kg.). Employees were informed that the experiment would involve the taking of chlorpromazine and alcohol and that it might help in making our highways safer. Three employee subjects were later dropped from the study, however, because of illness or failure to take the drug.

Because of the pressure of time the six patient subjects were chosen primarily because they were already taking 200 mg. of chlorpromazine per day and because they were relatively cooperative. They were given the same information about the experiment as employee subjects, except that no mention was made of chlorpromazine. A rerun of the experiment would dictate a more careful choice of patient subjects, as the participation of all was interfered with to some extent by their psychoses.

Tests Employed.—Because other investigators have found that routine, habitual, and reflex actions are little affected by low concentrations of alcohol, it was determined that more sensitive tests would need to be employed, tests which would call for the use of higher intellectual processes of coordination and judgment. It was presumed that these higher level processes would be more sensitive to the depressing or confusing effects of small amounts of alcohol.

The test battery selected comprised the following tests: (1) a digit-alphabet test requiring that letters be written below numbers according to a jumbled key—time limit 1½ minutes; (2) a tweezer dexterity test requiring that tweezers be used by the nonpreferred hand to insert 16 steel pins in a square of holes—timed; (3) counting backward by 1 from 100 for 30 seconds; (4) braking reaction time, with judgment, on an American Automobile Association Reaction Timer—subjects braked when a red light flashed but not when a green light flashed; (5) crossing out of groups of four dots randomly printed in rows with dot groups of other denominations—time limit 2½ minutes; (6) mental addition of 37 to lists of two-place numbers—time limit 1½ minutes; (7) differential lever pressing–reaction time to visual flashing of odd-odd and even-even digit combinations—odd-even combinations were also flashed, with the instruction that nothing be done when they appeared; and (8) matching the lengths of two lines in Mueller-Lyer and in vertical-horizontal illusions.

Specific tests were assigned to the three experimenters, who continued to administer the same tests throughout the project. Subjects were not informed of their test scores, although most had a fairly good idea of their success on some. Total testing time for the battery was approximately 20 minutes.

Results

Urine tests were positive for chlorpromazine in the two conditions involving its use. In the alcohol condition blood alcohol levels taken just prior to testing averaged 0.048%, with a standard deviation of 0.015. After testing the average was 0.038%, with a standard deviation of 0.010. In the alcohol-

chlorpromazine condition blood levels prior to testing averaged 0.042%, with a standard deviation of 0.013 and after testing, 0.035%, with a standard deviation of 0.011.

Table 1 shows results under the four experimental conditions. Since the concern was for comparative results, raw scores in each condition are not shown. Instead, scores made on a test in all four conditions were added together to make a total score. Percentages of this total score were then computed for each condition. These percentages are given in table 1. Score percentages in each of the four conditions were ranked from 1 for best to 4 for worst. This was done since higher scores are better in some tests but worse in others. The *t* test was applied to differences in raw scores between the placebo condition and the other three conditions. The *t* values are also shown in the table.

It will be noted that performance was best under the placebo condition, with the highest average rank on the eight tests (1.6). Rank performance was worst under the alcohol-chlorpromazine condition (3.5). Ranks on the other two conditions were nearly the same. The *t* test showed a significant difference between scores on the placebo and alcohol-chlorpromazine conditions in the case of three tests. On one other test, counting backward, the *t* value of 2.06 is just short of significance at the 0.05 level. In the alcohol condition scores on two tests were significantly lower than in the placebo condition. In the chlorpromazine condition scores were significantly below those in the placebo condition on one test. Scores on the illusions test were significantly lower in the alcohol-chlorpromazine condition than in the alcohol condition ($p<0.05$). Scores on the counting backward test were significantly poorer in the alcohol-chlorpromazine condition than in the chlorpromazine condition ($p<0.05$).

While test results were affected by all three drug conditions, the greatest impairment must be attributed to the combination of alcohol and chlorpromazine. This is demonstrated in table 2, in which score percentages on all eight tests in the placebo condition are compared with like percentages in the three drug conditions.

In order to determine the effects of the drugs on judgment and reasoning the eight tests were ranked by the experimenters on the basis of the degree to which their mastery required higher intellectual ability. The resultant rank order in terms of increasing ability required was as follows: tweezer dexterity, braking reaction with judgment, dot checking, choice reaction time, illusion line matching, counting backward from 100, mental addition of two-place numbers, and digit-alphabet matching. The rank order of *t* values for each drug condition shown in table 1 were determined. Ranks in each condition were then correlated with the degree of judgment rank as noted above, with results shown in table 2.

When alcohol and chlorpromazine were taken in combination, the correlation noted is just short of significance at the 0.01 level. This indicates that the confusing or inhibiting effects of the combination increased with increasing need on the tasks for higher intellectual ability and judgment. In the case of the alcohol condition the correlation is just short of significance at the 0.05 level.

Results confirm the earlier view which dictated planning for tests to be used in this study; namely, that tests requiring higher and more complex mental abilities should be used rather than tests of routine or reflex activities. Mental activities of a higher intellectual variety are more subject to the effects of alcohol.

Subjective Data.—At the conclusion of each test period subjects were asked to register the excellence of their over-all performance on a 10-point scale, with 10 representing the best performance they would be capable of. Patient subjects had great difficulty in doing this, so the results from the 15 normal subjects only will be presented. The average ratings under the different conditions are shown in table 2. The *t* test was applied to differences between ratings in the placebo and three drug conditions.

These self-ratings closely parallel actual test results, as shown in table 1, and indicate that subjects realized their performance under the alcohol-chlorpromazine condition was not up to that under

TABLE 1.—*Comparison of Test Results of Twenty-four Subjects Under Four Experimental Conditions*

	Condition									
	Placebo		Alcohol			Chlorpromazine			Alcohol-Chlorpromazine		
Test	%	Rank	%	Rank	*t*	%	Rank	*t*	%	Rank	*t*
Digit alphabet	26.2	1	24.4	3	2.61*	25.3	2	1.13	24.1	4	2.23*
Illusions	23.3	2	22.7	1	0.11	26.2	3	1.23	27.9	4	2.29*
Tweezer dexterity	25.0	2	24.2	1	0.61	25.1	3	1.58	25.7	4	0.52
Counting backward	24.5	2	25.3	3	1.24	23.8	1	0.25	26.4	4	2.06
Braking time	24.9	3	24.8	2	0.31	24.7	1	0.39	25.6	4	0.52
Mental addition	27.9	1	24.7	2	2.13*	24.3	3	2.61*	23.1	4	2.50*
Choice reaction	23.1	1	25.8	3	1.80	26.1	4	1.18	25.0	2	1.18
Dot checking	26.1	1	24.2	4	1.75	24.6	3	1.41	25.1	2	0.58
Average		1.6		2.4			2.5			3.5	

*$p<0.05$.

the other conditions. The difference between ratings under the placebo and alcohol-chlorpromazine conditions is highly significant.

Immediately after each test period the 15 employee subjects were asked to describe how they felt. After the alcohol-chlorpromazine session over 50% reported they were sleepy, and 40% reported feeling intoxicated or "groggy." These figures are twice as large as similar figures for the other three conditions combined. Peculiar to the alcohol-chlorpromazine condition also were such descriptions as "wobbly," "dizzy," "dull mentally," and "poorly coordinated"; almost half reported a lethargy described by two subjects as "not giving a damn." Three subjects spontaneously reported they got more effect from the alcohol on the day when they also had chlorpromazine. At the conclusion of the last experimental session, employee subjects were asked the following question: "If you had been driving an automobile instead of taking tests on the four test days, would there have been any one day when you would have been most unsafe as a driver?" Eighty-seven per cent picked the day on which they had both alcohol and chlorpromazine. The remainder chose the day when they received alcohol only.

TABLE 2.—*Comparison, Correlation, and Patient Evaluation of Results of Eight Tests Under Drug Conditions Versus Placebo Conditions*

	Drug Conditions		
	Alcohol	Chlorpromazine	Alcohol Plus Chlorpromazine
Comparison of composite score from all eight test results under placebo condition with test results under given drug condition			
t*	2.08	2.60	3.92
p	<0.10	<0.05	<0.005
Correlation between values of t and estimated degree of judgment required			
rho	0.619	0.154	0.827
p	<0.10		<0.05
Average self-ratings			
Rating†	6.4	6.3	5.5
t*	1.09	1.5	3.7
p	0.5	0.5	<0.01

* The t test was applied in each case to the difference between performance under placebo conditions and the given drug conditions.
† Ratings were on an arbitrary 10-point scale, with 10 representing the best possible performance. The three figures 6.4, 6.3, and 5.5 are to be compared with the average self-rating of performance under placebo conditions, which was 6.9.

Comment

The test results enabled us to reject the null hypothesis. As compared with the placebo condition, there was a significantly greater effect on coordination and judgment from a combined dosage of alcohol and chlorpromazine than from either of these drugs taken singly. In all eight tests employed, scores were worse in the alcohol-chlorpromazine condition than in the placebo condition. In the case of three tests, and almost so in the case of one other, the difference was significant at the 0.05 level of probability. When performance on all eight tests is compared, the difference is highly significant ($p<0.005$). Although performance was impaired in the alcohol condition, the degree of impairment was not nearly so great. This was true despite the fact that the average blood alcohol level in the alcohol condition (0.048%) was slightly higher than in the alcohol-chlorpromazine condition (0.042%). Although performance on the eight tests was impaired in the chlorpromazine condition ($p<0.05$), this impairment was less significant than in the alcohol-chlorpromazine condition ($p<0.005$).

A second interesting finding was the differential effect of the drugs on tasks requiring varying amounts of judgment and ability. Performance on higher level tasks was reduced in significantly greater degree than performance on lower level ones.

Greater impairment from the combination of drugs than from either one taken singly was recognized by the normal subjects, as indicated by their subjective ratings. Descriptions of their feelings while in the three drug states also revealed the greatest interference from the combination dosage.

Conclusions

Objective test data from all subjects and subjective evaluations from the normal subjects agree in pointing to a supplementary and possibly potentiating effect of chlorpromazine on alcohol in this experiment. In combination with chlorpromazine small amounts of alcohol were shown to significantly impair coordination and judgment, such as are needed for safe operation of automobiles and other complex machinery. It is therefore recommended that physicians who prescribe chlorpromazine should warn their patients of the possible dangers of the use of alcohol.

The placebos used in this study were supplied by Smith Kline & French Laboratories, Philadelphia.

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CLINICAL NOTES

EFFECT OF CIGARETTE SMOKING ON SERUM CHOLESTEROL AND LIPOPROTEIN CONCENTRATIONS

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and
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It has been suggested that cigarette smoking is in some way causally related to myocardial infarction and to coronary atherosclerosis. This is difficult to prove. Many investigators believe that the evidence is good for the association of hypercholesteremia and accelerated atherogenesis. If it could be shown that cigarette smoking is followed by a rise in serum cholesterol level, this could be interpreted as evidence in favor of a relationship of smoking and atherogenesis.

Methods of Study

The subjects of the present study were laboratory personnel. Fifteen were regular smokers; five were nonsmokers. A low-fat breakfast was eaten at about 7 a.m. The subjects refrained from smoking or taking fluids after 9 a.m. At 11:30 a.m. a control blood sample was taken, after which the subject smoked two nonfilter-tip cigarettes within a 10-minute period, inhaling deeply. Immediately, 10 minutes, and 30 minutes after the smoking was finished blood was collected. To determine the reproducibility of the procedure, three subjects (2, 11, and 12) were used on two occasions.

Two nonsmokers had blood drawn at intervals similar to those of the smokers. They breathed more deeply than usual for 10 minutes. The procedure was repeated when they smoked two cigarettes.

The serum cholesterol level was determined by the method of Abell and associates.[1] Serum lipoprotein levels were estimated on some samples ultracentrifugally at a density of 1.063 by the method of Gofman and associates [2] or at a density of 1.21 by the method of Lewis and associates.[3]

TABLE 1.—*Serum Cholesterol Concentration Before and After Smoking*

Subject No.	Cholesterol Level, Mg./100 Ml. Presmoke	End of Smoke	10 Min. After End of Smoke	30 Min. After End of Smoke	Age, Yr.	Sex	Smoking History
1.....	213	184	190	227	31	M	Normally smokes about 1 pack nonfilter-tip cigarettes per day
2A.....	*	172	169	181	43	M	Normally smokes about 1 pack filter-tip cigarettes per day
B.....	172	167	165	162			
3.....	287	295	280	280	51	F	Normally smokes about 10 to 15 cigarettes (nonfilter) per day
4.....	325	329	319	323	42	M	Normally smokes about 15 to 20 nonfilter-tip cigarettes per day
5.....	178	188	191	179	23	F	Normally smokes about 1 pack filter tip, mentholated cigarettes per day
6.....	175	165	163	165	20	M	Normally smokes about 1 pack filter-tip cigarettes per day
7.....	174	179	171	171	21	M	Normally smokes about 1 pack filter-tip cigarettes per day
8.....	254	254	251	264	48	M	Normally smokes about 1 pack filter-tip cigarettes per day
9.....	192	191	198	188	29	M	Normally smokes about 1 pack filter-tip cigarettes per day
10.....	158	166	163	164	28	M	Normally smokes about 1 pack filter-tip cigarettes per day
11A.....	248	...	237	248	45	M	Nonsmoke control; does not usually smoke
B†.....	256	258	258	261			
12A.....	292	...	288	270	48	F	Nonsmoke control; does not usually smoke
B†.....	286	292	292	285			
13.....	228	224	227	231	34	F	Does not usually smoke
14.....	227	224	218	218	27	M	May not smoke cigarettes regularly; shifts to pipe for weeks
15.....	251	251	241	248	25	M	Smokes about 1 pack filter-tip cigarettes per day
16.....	176	170	...	...	17	F	Smokes about 1 pack filter-tip cigarettes per day
17.....	204	189	190	181	22	F	Smokes between ½ and 1 pack filter-tip cigarettes per day
18.....	273	278	271	278	47	F	Does not usually smoke
19.....	210	207	198	211	28	M	Does not usually smoke
20.....	194	198	190	188	21	M	Smokes between 5 and 10 cigarettes per day

* Lost.
† Smoked.

From the Research Division of the Cleveland Clinic Foundation and the Frank E. Bunts Educational Institute.

Results

The serum cholesterol concentration immediately after and a short time after smoking was essentially unchanged in most subjects (table 1). There seemed to be no greater variations in the subjects who were habitual smokers than in the nonsmok-

ers. In one man, subject 1, there was a decrease, apparently as a result of smoking. The cause for this was not found. Subject 12, who was studied after no smoking on the same day as subject 1, showed a slight, but not significant, decrease one-half hour after 10 minutes of deep breathing.

There was no significant change after smoking in the serum lipoprotein pattern of the 10 subjects for whom the lipoprotein levels were measured, at densities 1.063 and 1.21. The lipoprotein results (table 2) serve to show the good reproducibility of the method; the patterns looked like duplicates of the same sample.

Small variations in the total cholesterol concentration were accompanied by similar small changes in total protein level, suggesting that they were probably due to slight fluid shifts.

TABLE 2.—*Serum Lipoprotein Levels Determined at Two Densities Before and After Smoking*

Subject No.	Sample No.*	Total Protein Level, Gm./100 Ml.	Cholesterol Level, Mg./100 Ml.	Lipoprotein Level, Mg./100 Ml.						
				S70-400‡	40-70‡	25-40‡	20-25‡	1-10‡	Sf12-20§	Sf20-100§
11	A	...	256	90	71	390	14	212	..	..
	B	...	258	71	71	376	14	225	..	..
	C	...	258	71	60	390	19	212	..	..
	D	...	261	38	71	430	14	230	..	..
13	A	7.35	228	38	56	260	19	333	..	..
	B	7.50	224	33	52	280	19	345	..	..
	C	7.50	227	28	56	285	23	336	..	..
	D	7.50	231	33	52	290	19	348	..	..
14	A	7.60	227	52	71	400	23	225	78	26
	B	7.60	224	47	71	400	23	243	87	22
	C	7.55	218	42	66	400	33	207	70	30
	D	7.60	218	52	52	376	23	216	65	34
15	A	7.00	251	28	71	390	19	320	69	52
	B	7.00	251	33	66	376	19	330	65	47
	C	6.75	241	38	71	420	14	276	69	47
	D	7.00	248	19	66	400	19	295	61	43
16	A	...	176	23	35	260	19	322	..	..
	B	...	170	26	30	280	16	340	..	..
17	A	6.80	204	19	33	260	28	244	14	18
	B	6.68	189	14	28	240	28	255	14	11
	C	6.48	190	19	24	240	23	260	14	18
	D	6.48	181	19	28	250	28	244	..	..
18	A	6.95	273	49	66	450	21	380	70	53
	B	7.12	278	†	†	†	†	†	70	58
	C	6.70	271	38	66	400	24	345	60	72
	D	6.75	278	42	61	420	21	345	65	53
19	A	6.52	210	24	73	255	14	258	..	..
	B	6.65	207	35	77	265	14	280	..	..
	C	6.60	198	35	71	276	14	276	..	..
	D	6.65	211	42	75	280	14	299	..	..
20	A	7.05	194	9	45	270	19	255	..	..
	B	7.10	198	9	33	285	23	225	..	..
	C	7.00	190	0	33	300	23	239	..	..
	D	7.00	188	0	37	280	19	243	..	..
2B	A	...	172	0	19	174	19	322	..	..
	B	...	167	0	14	160	19	310	..	..
	C	...	165	0	19	180	14	300	..	..
	D	...	162	0	14	174	14	310	..	..

* Sample A = presmoking "control"; B = end of smoking; C= 10 minutes after end of smoking; and D = 30 minutes after end of smoking.
† Lost in preparation.
‡ Determined at density 1.21.
§ Determined at density 1.063.

Comment

The results reflect the relatively stable level of the serum cholesterol and lipoprotein levels for short periods. The slight stress of blood drawing or smoking was not sufficient to modify them.

The lack of effect of smoking on the cholesterol and lipoprotein levels in the nonsmoking persons was striking. They had smoked two cigarettes with inhaling, and this could be considered to be a not inconsiderable stress. At the end of the smoking both subjects felt dizzy and chilly but no change was observed.

We know little of the long-time effect of smoking on the serum cholesterol or lipoprotein levels. Changes in eating habits resulting from smoking could play an important part in varying the cholesterol concentration.

In a study of serum lipoprotein and cholesterol levels in smokers as compared with nonsmokers, Gofman and associates [4] observed a significantly higher concentration in men aged 20-29 years who smoked. The differences were not significant in the older age group of either men or women. In our studies there was no difference between the results on young or older subjects or between the sexes.

Summary

The rapid smoking of two nonfilter-tip cigarettes by habitual smokers or nonsmokers was without effect in modifying serum cholesterol or lipoprotein concentrations during the 30-minute period immediately after smoking. If this form of smoking is a stress, it is insufficient to change blood cholesterol or lipoprotein levels during short periods of time. Over short periods of time the cholesterol and lipoprotein levels are constant.

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TREATMENT OF POSTALCOHOLIC SYNDROME WITH TRIFLUPROMAZINE HYDROCHLORIDE

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The acute alcoholic inmate of a county or city prison presents special problems of management. The boisterousness, hallucinosis, nausea, tremors, and involuntary defecation and urination, which characterize the postalcoholic state, are not only distressing to the prisoner but also add to the general disturbance of the prison population and increase the burden of custodial care. To alleviate these problems, a simple regimen, effective in controlling withdrawal symptoms in the alcoholic prisoner, is desirable.

In recent years, a number of the so-called tranquilizing drugs have been employed in the treatment of the alcoholic patient. Some of the most effective of these drugs in treatment of patients in the postalcoholic state have been the phenothiazine derivatives.[1] Recently a new phenothiazine compound, trifluprom azine hydrochloride, has been made available for trial in controlling symptoms of alcohol withdrawal.

For about a year, trifluprom azine, supplied as Vesprin, has been under study at the Denver city jail, to evaluate its effectiveness in treating alcoholic prisoners. Up to the present time a total of 252 prisoners have been treated with trifluprom azine hydrochloride. From the results obtained, it would appear that this substance is a valuable adjunct in the treatment of the postalcoholic syndrome. Results of this study are briefly reported.

From the Police Department, City and County of Denver.

Methods and Materials

Patients.—The series comprised a total of 252 subjects. Of these, 221 were men, and 31 were women. All were intoxicated on admission, but none had acute delirium. None of the prisoners was addicted to narcotics. The symptoms of alcohol withdrawal which were observed during this study included boisterousness, tremors, hallucinosis, and nausea. Police officers were provided with check sheets on which to record their observations of the patients (table 1). Representative blood pressure readings were taken at random among the prisoners to serve as "spot checks" for any hypotensive response to the drug. Instructions were given to record any other undesirable reactions to the drug.

TABLE 1.—*Check Sheet Used by Police Officers to Record Effects of Trifluprom azine on Prisoners*

This drug is to be used in the city jail experimentally and the results observed and reported to Dr. Goldman. The dosage is one (1) tablet which may be followed with another every four (4) hours, if necessary. It is to be used for the shakes and other postalcoholic reactions.
Fill in the 1st and 2nd lines at the time the drug is given.
After observing the prisoner for one hour or more the report may be completed and filed in the medicine box.

1. Prisoner's name		
2. Date and time given		
3. Time of observation		
4. Did the prisoner's nausea seem to improve?	Yes	No
5. Did the prisoner's shakes seem to improve?	Yes	No
6. Was the prisoner able to go to court or be released?	Yes	No
7. Did the prisoner seem to improve?		
8. Officer's name		

Medication.—Trifluprom azine was administered orally in doses of 25 mg. every four hours until the described symptoms disappeared or became

worse (indicating that the drug was ineffective in these cases). In cases in which there was no apparent response to the drug, the dosage was increased so that at least four doses (25 mg. each) were given within 6 to 12 hours. Total daily doses ranged from 150 to 400 mg.

Results

In 212 of the 252 patients treated with trifluromazine, at least two of the observed symptoms improved (table 2). Sixteen patients required treatment for 24 hours or longer before any improvement was apparent. Forty patients showed no improvement at any time (or their symptoms became worse) after administration of trifluromazine. All of those who responded to trifluromazine markedly improved in their boisterousness and hallucinations. The drug failed to control nausea in 43 subjects or tremors in 49. Of the 221 men treated, 182 (82.4%) improved and 39 did not.

TABLE 2.—*Effectiveness of Trifluromazine Hydrochloride in Controlling Symptoms in 252 Patients During Alcohol Withdrawal*

Symptoms Evaluated	Patients: Improved, No.	Patients: Unimproved, No.	% Improved
Boisterousness	212	40	84.2
Tremors	203	49	80.6
Hallucinosis	212	40	84.2
Nausea	209	43	82.5

Of the 31 women treated, 30 (96.8%) improved and only one did not. No significant changes in blood pressure were observed in the "spot check" readings made after administration of trifluromazine. No other undesirable reactions to the drug were recorded.

Comment

The results of this study support the observations of others [2] that trifluromazine is useful in controlling symptoms of alcohol withdrawal. The effectiveness of the drug in controlling the boisterousness and hallucinosis in the majority of alcoholic prisoners under treatment was a definite contribution to an increased equanimity and easier management of the prison population. The period of therapy was too short to permit critical evaluation of undesirable side-effects or allergic reactions to the drug; but the fact that no significant hypotensive or other side-effects were observed indicates that, in the doses given, side-effects would present little, if any, difficulty.

The greater effectiveness of trifluromazine in women than in men may have clinical significance. A better level of improvement in behavior has also been reported in female than in male schizophrenic patients during treatment with trifluromazine.[3] Further studies to ascertain whether a difference exists in the response of the different sexes to this therapy would be of clinical interest.

Summary

A total of 252 alcoholic prisoners was treated with trifluromazine (Vesprin) hydrochloride to control the acute symptoms of alcohol withdrawal. This drug was administered orally in doses of 25 mg. every four hours for total doses ranging from 150 to 400 mg. daily. In 212 of the 252 patients, or 84.2%, improvement was observed. By controlling the boisterousness and hallucinosis in these patients, treatment with trifluromazine particularly helped to facilitate custodial care of these prisoners. It would appear that this is a valuable adjunct in the treatment of the postalcoholic syndrome.

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THE NORMAL ABDOMEN IN YOUNG PEOPLE.—To determine which abdominal organs are palpable in normal people, the abdomens of 100 healthy male medical students and 100 female student nurses (18-24 years of age) were examined: The descending colon and caecum were felt in most subjects. The wall of the abdominal aorta was felt in most females, but in only about half the males. The liver was felt in only 11 women and 2 men. The right kidney was felt in 11 women but in none of the men; the reason why it is so rarely palpable is the thickness and resistance of the soft tissues and not its position. Other abdominal organs are not normally palpable.—J. G. Bearn, M.B., and T.R.E. Pilkington, M.D., Organs Palpable in the Normal Adult Abdomen, *Lancet*, Aug. 29, 1959.

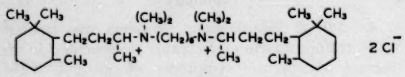
COUNCIL ON DRUGS

NEW AND NONOFFICIAL DRUGS

The following descriptions of drugs are based on available evidence and do not in any case imply endorsement by the Council.

H. D. KAUTZ, M.D., *Secretary.*

Triclobisonium Chloride (Triburon Chloride).—N,N'-Bis[1-methyl-3-(2,2,6-trimethylcyclohexyl)propyl]-N,N'-dimethyl-1,6-hexanediamine bis(methochloride).—The structural formula of triclobisonium chloride may be represented as follows:



Actions and Uses.—Triclobisonium chloride, a bisquaternary ammonium compound, is an antibacterial agent; applied topically, it is used in the management of superficial skin infections and vaginitis. The organisms most sensitive to its effects, in vitro, are strains of Staphylococcus pyogenes var. aureus, including some that are resistant to commonly employed antibiotics, Streptococcus pyogenes, Diplococcus pneumoniae, Listeria monocytogenes, and Salmonella typhi. In higher concentrations, it inhibits the growth of Pseudomonas aeruginosa, some fungi, and Trichomonas vaginalis. Some strains of Escherichia coli are moderately sensitive, whereas others are almost completely resistant.

Despite its antimicrobial activity in vitro, the efficacy of triclobisonium chloride in the treatment of superficial infections caused by the aforementioned organisms is not clearly established. Early trials have been uncontrolled studies in which no systematic comparison with other quaternary ammonium compounds or with other local anti-infectives, including topically applied antibiotics, was attempted; no double-blind study has been reported. Nevertheless, early clinical reports, especially when the drug was used in the treatment of impetigo contagiosa, are favorable; the drug is said to accelerate recovery in acute folliculitis, furunculosis, infectious eczematoid dermatitis, and other primary pyodermata and secondarily infected dermatoses. It is also reported to be helpful in the management of Trichomonas vaginalis vaginitis, and, to a lesser extent, monilial, and so-called nonspecific vaginitis. Fungus infections of the skin respond poorly. Thus, if subsequent properly designed clinical experimentation substantiates these preliminary impressions, triclobisonium chloride can be regarded as a useful adjunct in the management of superficial infections caused by susceptible organisms.

Topical application of triclobisonium chloride to the skin produces some degree of primary irritation in about 1% of patients; others exhibit signs of sensitization after repeated application. Although, in one study utilizing the closed patch technique, about 2% of normal human subjects developed allergic responses to triclobisonium chloride, fortunately the incidence of such reactions in the clinical use of the drug has been somewhat lower. Experimental instillation of a 1% solution into the eye of the rabbit provoked a slight erythema which subsided within 48 hours and left no residual damage; 0.1% solutions produced no irritation. Ointments and solutions of triclobisonium chloride produced no untoward effect when applied to the vagina of the rabbit. Local application of the drug has not produced toxic effects attributable to systemic absorption either in man or in experimental animals.

See also the general statement on cationic agents in the section on disinfectants and antiseptics in New and Nonofficial Drugs.

Dosage.—Triclobisonium chloride is applied topically or intravaginally. For the treatment of pyogenic diseases of the skin, a cream or ointment containing 0.1% triclobisonium chloride is applied to the affected area three or four times daily and is rubbed in gently. If the drug is applied to extensive or acutely inflamed areas, the patient should be carefully observed for evidence of systemic toxicity, even though such effects have not yet been reported. Because of the occurrence of primary irritation and allergic reactions in some patients, unsupervised use of the drug is not recommended. For the treatment of vaginitis, a single application of triclobisonium cream (0.1%) is introduced into the vagina each night.

Preparations.—cream (topical, vaginal) 0.1%; ointment (topical) 0.1%.

Year of introduction: 1959.

Hoffmann-LaRoche, Inc., cooperated by furnishing scientific data to aid in the evaluation of triclobisonium chloride.

Additional Uses of Chloroquine (Aralen) Phosphate

The Council has reviewed the available evidence concerning the use of chloroquine phosphate in the treatment of lupus erythematosus and rheumatoid

arthritis. The use of the drug in the treatment of malaria and systemic amebiasis is currently described in New and Nonofficial Drugs.

The value of chloroquine phosphate in chronic discoid lupus erythematosus is now generally accepted. It appears to be equally as effective as quinacrine and considerably less toxic. About 60% of patients exhibit complete remission or marked improvement characterized by regression of skin lesions and increased tolerance to light. Progress is most rapid during the first month of treatment but may continue at a more gradual rate for several weeks thereafter. About one-third of the patients who respond relapse when administration of chloroquine phosphate is discontinued, but many of these will again respond to readministration of the drug.

The status of chloroquine phosphate in the disseminated or systemic form of lupus erythematosus is controversial. The drug must not be relied upon in the acute form of the disease. In the subacute and chronic phases, some investigators have reported favorable results, whereas others have expressed the opinion that the drug aggravates the symptoms and is contraindicated. Large doses are said to be especially likely to cause a flare-up of constitutional symptoms. The administration of small doses of chloroquine phosphate to patients receiving adrenocorticosteroids has been reported to produce favorable results and to make possible a reduction in dosage of the steroids.

Chloroquine phosphate frequently produces some symptomatic relief in rheumatoid arthritis and thus may be a useful supplement to the basic therapeutic regimen of rest, physiotherapy, and diet.

In this condition the response is typically delayed; although subjective relief may be reported within 2 weeks after administration is begun, objective signs of improvement are ordinarily visible only after 6 weeks to 3 months, and maximum benefit only after 6 to 12 months. Any improvement produced is generally maintained with continued treatment, although many patients continue to exhibit minor exacerbations and remissions. As might be expected, patients with gross joint damage respond poorly; otherwise there is little correlation between the degree of response and the duration and stage of the disease or the severity of the inflammatory process. The sedimentation rate, erythrocyte count, and other laboratory findings may show a little change, even in the presence of clinical improvement. Chloroquine phosphate may be used in conjunction with salicylates, and, when so used, a reduction in dosage of the latter drugs is often possible. Combinations of chloroquine phosphate and adrenocorticosteroids, gold salts, and other antirheumatoid drugs have had only limited trial; the value and possible dangers of such combinations are unknown, but it would seem that drugs with similar side-effects, such as rashes, should be avoided. Patients who have relapsed while on steroid therapy rarely respond to administration of chloroquine phosphate.

The mechanism of action of chloroquine phosphate in lupus erythematosus and rheumatoid arthritis is unknown. It has been suggested, however, that these and other collagen diseases represent hypersensitivity reactions and that chloroquine phosphate suppresses the formation of the antigens responsible for the reactions, whereas adrenocorticosteroids interfere with the reaction after it is established.

Although chloroquine phosphate is well tolerated as used in the treatment of malaria, side-effects occur frequently and are often of considerable severity when it is employed for the treatment of lupus erythematosus or rheumatoid arthritis. About 10% of patients with these diseases are unable to tolerate adequate doses. The percentage of patients to whom the drug is acceptable can be increased by starting with very small doses and gradually increasing this dosage. Among the less serious reactions reported are headache, pruritus, visual disturbances, gastrointestinal complaints, and lymphedema of the forearm and hands. Skin reactions occur frequently and include dryness, itching, urticaria, maculopapular eruption, desquamation, exfoliation, increased pigmentation, alopecia, and graying or bleaching of the hair; preexisting psoriasis may become worse. Exposure to the sun or to ultraviolet may severely aggravate the dermatitis. The more severe skin reactions often necessitate withdrawal of the drug. Leukopenia, which has been reported, also requires that administration of the drug be stopped. Temporary blurring of vision due to interference with accommodation has been observed. Corneal changes, such as edema or opacification of corneal epithelium, with or without such symptoms as visual halos or blurred vision, have been noted on slit-lamp examinations. These changes, which may begin several weeks to several years after treatment is begun, are thought to be reversible. Should such changes occur, however, the advantages of discontinuing the drug must be weighed, in each case, against the therapeutic benefits that may accrue from continuation of treatment. Gastrointestinal intolerance, dizziness, and headaches also occur.

All patients receiving chloroquine phosphate should have periodic blood cell counts.

The dose of chloroquine phosphate in chronic discoid lupus erythematosus is 250 mg. per day, administered orally. Treatment may be continued until maximum benefit is obtained. Should relapse occur after the drug is withdrawn, it may again be administered at the same dosage level.

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If chloroquine phosphate is tried in disseminated lupus erythematosus, the initial doses should be very small: 25 to 50 mg. given on alternate days. The dosage may be gradually increased in accordance with the patient's tolerance. The use of larger doses initially may precipitate an acute exacerbation of an already critically severe illness.

In the treatment of rheumatoid arthritis, 250 mg. is administered daily as a single oral dose. If no beneficial effects are apparent after 6 to 12 weeks of treatment, it is unlikely that continued administration of the drug will result in improvement, though maximum response may be delayed for six months or more.

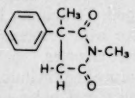
If troublesome minor side-effects appear during the treatment of either rheumatoid arthritis or lupus erythematosus, the drug should be withdrawn for a few days and treatment reinstituted at a reduced dosage level. The dose may then be cautiously and gradually increased as the patient's tolerance permits.

Administration of chloroquine phosphate should be stopped immediately, and should not be resumed, if marked leukopenia or severe skin reactions appear.

The Council voted to amend New and Nonofficial Drugs to describe the use of chloroquine phosphate in the treatment of rheumatoid arthritis and lupus erythematosus.

Winthrop Laboratories cooperated by furnishing scientific data to aid in the evaluation of these additional uses of chloroquine phosphate.

Methsuximide (Celontin).—N,2-Dimethyl-2-phenylsuccinimide.—The structural formula of methsuximide may be represented as follows:



Actions and Uses.—Methsuximide is an anticonvulsant agent closely related chemically and pharmacologically to phensuximide. The two drugs show a similar pattern of activity in suppressing experimentally induced seizures in animals and both are relatively more effective against convulsions induced by pentylenetetrazole than those produced by electroshock.

In the reported clinical trials, methsuximide reduced significantly the incidence of seizures in about 40% of the patients in whom it was used. Approximately 45% of the patients with petit mal seizures, 40% of those with psychomotor attacks, but only 20% of those with grand mal epilepsy responded favorably. It provided complete control of seizures in about 15% of cases of petit mal and 10% of psychomotor attacks.

Approximately 30% of patients receiving methsuximide experience undesirable side-effects. In descending order of recorded frequency these include drowsiness, ataxia or dizziness, gastrointestinal disturbances (including anorexia, nausea, vomiting, constipation, diarrhea), skin eruptions, irritability, psychic disturbances (ranging from slight alterations of mood or personality to occasional acute psychoses), headache, and diplopia or blurring of vision. Fever, hiccough, and severe diaphoresis have been observed in a few patients. In many instances, aside from patients with rash, reduction in dosage results in elimination of the toxic manifestations.

Although it has not been definitely established that methsuximide damages either the kidney or the liver, several reports are suggestive of such damage; therefore, patients receiving the drug should be carefully observed for evidence of renal or hepatic dysfunction. Two patients have developed periorbital edema, associated in one with albuminuria, during methsuximide therapy. Two others have manifested signs suggestive of hepatic dysfunction, including positive cephalin flocculation test, icterus, tenderness in the region of the liver, and spider angiomas. Although examination of the peripheral blood has disclosed no evidence of adverse effects on the hematopoietic tissues, periodic blood studies should be made during therapy.

In chronic toxicity studies in animals, methsuximide was well tolerated; in rats, however, very large doses produced mild to moderate central lobular necrosis and other cytological changes in the liver.

Methsuximide is not the drug of first choice in any of the forms of epilepsy. It may be effective, however, when other drugs fail. It is most apt to be useful in many cases of psychomotor seizures, which are frequently refractory to other drugs. It may also be tried in petit mal seizures when older, conventional drugs are ineffective or are not tolerated by the patient. Methsuximide is of little, if any, value for the control of grand mal seizures. Methsuximide is apparently more effective when used in conjunction with other drugs; there is no contraindication to using it in combination with any of the other anticonvulsants. The most effective combinations, however, remain to be determined.

Dosage.—Methsuximide is administered orally. The optimal dose for controlling seizures must be carefully determined for each individual patient. However, 300 mg. per day is suggested for initiating treatment. Then, if necessary, the dosage may be gradually increased over a period of several weeks, until a total daily dose up to 1.2 Gm. is reached.

Preparations.—capsules 300 mg.

Year of introduction: 1958.

Parke, Davis & Company cooperated by furnishing scientific data to aid in the evaluation of methsuximide.

MEDICAL EDUCATION IN THE UNITED STATES AND CANADA

Fifty-Ninth Annual Report on Medical Education in the United States and Canada by the Council on Medical Education and Hospitals of the American Medical Association

Walter S. Wiggins, M.D., Glen R. Shepherd, M.D., John Hinman, M.D., and Anne Tipner

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ACKNOWLEDGMENT

This represents the 59th Annual Report on Medical Education in the United States and Canada compiled by the Council on Medical Education and Hospitals. This report is concerned primarily with basic medical education and is a part of the Council's response to one of the charges given it many years ago "To make an annual report to the House of Delegates on the existing conditions of medical education in the United States." Other levels of medical education are the subjects of annual Council reports dealing with internships and residencies [1] and postgraduate medical education.[2]

Much of the statistical data presented were derived from medical schools' responses to a questionnaire prepared jointly by the staffs of the Council on Medical Education and Hospitals of the American Medical Association and the Association of American Medical Colleges. As far as possible, data available through the Association of American Medical Colleges were utilized in place of requesting similar information directly from the medical schools. Data concerning medical education in Canada were collected through the cooperative efforts of the Association of Canadian Medical Colleges.

The Council on Medical Education and Hospitals is pleased to express appreciation for the American Medical Association to the individual medical schools, the Association of American Medical Colleges and the Association of Canadian Medical Colleges, governmental agencies and other organizations and individuals whose cooperation in furnishing information has made the preparation of this report possible.

NEEDS IN MEDICAL PERSONNEL AND EDUCATIONAL FACILITIES

In recent reports,[3] the Council on Medical Education and Hospitals has indicated sincere concern that there be implemented careful planning directed toward the expansion of educational facilities in medicine. All thoughtful individuals and organizations recognize that a rapidly growing population which becomes ever more health conscious will require a greater number of well qualified physicians as well as other health personnel.

The provision of educational opportunities for the number of medical students adequate to satisfy medical service needs as the general population grows in size is a huge task. To accomplish this task and at the same time maintain high standards of medical education represents a challenge at least as important as any problem facing medicine today.

QUANTITATIVE CONSIDERATIONS

Medical Service Requirements

In general, medical schools have developed to the present in response to local, state or institutional needs and desires. Perhaps fortuitously, the facilities established in this manner have kept pace largely with the immediate service demands of the public and educational desires of young people seeking careers in medicine.

How medical manpower requirements of the future can be met must be dependent initially on reaching agreement as to the dimensions of the requirement.

The problems related to the provision of adequate medical manpower for the future are becoming increasingly urgent. It appears that the time is at hand for accepting available knowledge as the basis for the best possible working definition of future medical requirements.

Two years ago, the Council's Annual Report on Medical Education [3b] explored some of the complexities of utilizing physician population ratios in projecting medical manpower needs. The 54th Congress on Medical Education and Licensure [4] brought together thoughtful leaders of higher education, business and industry, labor, agriculture, insurance, sociology, political science as well as medical practice and medical education. These representatives of large consumer groups and purveyors and producers of medical education considered together the challenges and future needs in medical service and education. Certain of the opinions generally supported by one of the representative groups at that Congress were:

1. The demand for medical service has been approximately in equilibrium with the supply.

2. The physician-population ratio, although not ideal, does constitute the best measure for planning the future medical care which can be brought to bear on the problem at the present time.

3. Since the level of medical care provided by the existing ratio is reasonably satisfactory, until there is a better measure of future needs, it would be prudent to pursue that ratio in planning for the production of physicians over the next several years.

4. Under no circumstances should any course of action be adopted which would cause a deterioration in the quality of medical education.

The physician-population ratio has remained relatively constant throughout the past forty years. During this same period, there have occurred sweeping changes of social, economic and scientific natures which have exercised important influences on the quality and quantity of physicians' services. Some of these changes have assisted in spreading a physician's services over a wider segment of the population; others have tended to restrict the populace served by the physician. Morbidity and mortality data for this four decade period support the contention that the spreading and restricting factors have balanced one another to a reasonable degree. This has allowed the level of medical care to advance grossly, though perhaps not ideally, with advances in medical science.

Therefore, it appears that the best available knowledge for projecting future medical manpower needs is on the basis of the existing physician-population ratio. In utilizing this base, its defects should be acknowledged so that projected figures are recognized as estimated and not endowed with a finiteness which they do not possess.

There have been several recent studies [5] which have projected medical manpower needs on this basis. Although the resulting estimates have differed in degree, they all indicate clearly that there will be required a significant increase in the number of physicians graduated to maintain the present ratio. The projected increment for 1975 over present numbers of medical graduates range from 2,000 to 3,500. In general, the smaller estimates were made earlier when population projections were at a lower level. However, the highest estimate [5d] includes factors other than the simple linear relationship between the anticipated population growth and the number of medical school graduates.

It is expected that in 1960 there will be approximately 7,000 graduates of U. S. medical schools. In view of the estimates referred to above, should the goal for 1975 be 9,000 or 10,500 annual graduates? Because of the potential for error inherent in estimates of this nature which can be significantly altered by many factors—particularly economic ones with their inevitable effect on birth rates—it would seem reasonable to accept as the present goal for 1975, the need for 10,000 graduates from our medical schools.

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Educational Facility Requirements

It is important to recall that the general population whose medical service needs must be satisfied will not suddenly change between 1974 and 1975. The population growth will occur on a daily, monthly and annual basis gradually and persistently increasing to the projected total of 235 million by 1975. Similarly, the expansion in educational facilities in medicine should take place gradually and persistently. This will allow for periodic adjustment of the goal of 10,000 graduates by 1975 in keeping with any gross changes in population projections that occur.

The fundamental issue does not involve the question of which of the various studies have resulted in the most accurate estimate of the need for increased numbers of medical school graduates. *The basic and urgent concern is that all estimates indicate a need for expansion of educational facilities in medicine in a brief period which far exceeds any expansion of such facilities that has occurred in a similar period during modern times.*

There are three methods which can be used to meet the need for expanded educational facilities in medicine. They are (1) expanding the capacity of existing medical schools, (2) the development of new medical schools, and (3) the combined expansion of existing schools and the creation of new ones.

Increasing the capacity of existing medical schools would be least costly in terms of capital expenditures and operating costs. Medical schools now functioning have indicated that if funds were available for the necessary construction, it would be possible for them to increase their enrollment by approximately 1,000 students.

Increasing enrollment through this method has the additional advantage of being capable of attainment in a reasonably short period of time. It can be hoped that this approach will satisfy largely the increased needs of the most immediate future. Care must be exercised that medical schools not be induced to expand beyond their capacity to maintain the proportionately increased teaching staff necessary to preserve high standards of education and research.

Because of a justifiable concern with long range financing, several schools were hesitant to indicate the possibility of more than a very modest expansion.

There is a general agreement that the total predicted need for additional graduates cannot be met through adjustments in enrollment of present schools. New medical schools will have to be developed even though existing schools expand. It appears likely that at least ten new schools with an average graduating class of 100 students will be required. At the moment it does not appear urgent that a firm decision be made as to the total number of new institutions that must be established. It is clear that planning for the construction of five additional institutions could be implemented in the very near future without any concern that this number would saturate the need. No parent university will undertake the large expense of a medical school development unless it is convinced that it is necessary. Because of the considerable period required for the study and planning of a medical school's establishment, there will be ample opportunity to re-evaluate future needs so there should be no concern that there will be any overdevelopment.

The present and urgent concern is that there is little secure evidence that the most conservative estimates of medical manpower requirements of the immediate future will be met. The University of Kentucky Medical Center in Lexington is under construction and will admit its first medical school class in September, 1960. The state legislature in Texas has passed enabling legislation for the construction of a third University of Texas Medical School in San Antonio. The University Regents are in the process of site selection and planning but there have been no funds appropriated for capital or operating expenses. Although other institutions and organizations have expressed interest in such a development, there are no other firm commitments.

The Council on Medical Education and Hospitals and the Association of American Medical Colleges have published statements encouraging universities to consider the establishment of two year schools of basic medical sciences. Present medical schools have indicated that their clinical facilities would enable them to accept up to 700 graduates of two year schools into the third year class. Schools of basic medical sciences now functioning have established an effective role for such schools. If others are developed, it is likely that over a period of time some of them would expand to the full four year program. In this instance, it is again important to recognize the inappropriateness of concern with the numbers of basic science schools to be developed until there is some evidence that accepted needs are likely to be satisfied.

The combined approach of expansion of existing schools and development of new schools should prove least costly; it should produce the increasing number of physicians in the gradual manner in which they will be required and at the same time make allowance for geographically orienting new medical schools to population movement.

QUALITATIVE CONSIDERATIONS

The present concern for producing an adequate number of medical school graduates in the future must not overshadow a persisting and concentrated effort to improve the effectiveness of medical education, research and service. As planning for expanded educational facilities take place, present high standards must be maintained in proportion to advances in knowledge.

Medical Students

In the production of capable physicians for careers in medical practice, teaching and research, the single most important element is the quality of the student. A competent and dedicated faculty and a fine physical plant can assure that the student will perform at the highest level of which he is capable. It is very important that faculty and facilities provide the most productive and challenging environment for the student's learning. It is equally important to recognize that the student's inherent ability is the ultimate determinant of his performance. He cannot be raised above himself.

There exists today a widespread interest in all areas of science to attract students of superior ability. In an address before the Federation of State Medical Boards at the 55th Annual Congress on Medical Education and Licensure, Cooper [8] expressed medicine's dilemma, ". . . the increasing mass of scientific knowledge in medicine, the medical sciences, and the behavioral sciences and the deepening complexity of medical practice call out for students with ever greater intellectual capacity and dedication than in the past. If students are not equal to this heavier burden, there can only be compromise with the high level of education necessary to prepare them for the profession. . . . Medicine is finding increased competition for the pool of top-ranking students because it no longer occupies the unique position as a profession which it held in the past and shared largely only with law and the ministry. The professions open to the college graduate are now much broader, and they provide the prestige, intellectual satisfaction, and financial rewards comparable to those offered by medicine. . . . The vast sums of money available for fellowships and research assistantships in the expanding research budgets almost guarantee the total expenses of graduate education for all but a small fraction of students in the physical, biological, and behavioral sciences. Medicine has no equivalent source of subsidy for its students."

While there is as yet no certain documentation that medicine is not attracting its share of well qualified college students, it is evident that the exciting career possibilities in other sciences have captured the imagination of the public at large. Medicine must make active efforts to inform young people of the breadth of interests and challenges it offers or surely it will suffer a serious loss of the best young talent. Through the joint endeavors of the American Medical Association and the Association of American Medical Colleges, informative career information has been developed in interesting form for high school students. Medical teachers and practitioners should take advantage of every opportunity to present this information to young people.

The high birth rates of the early years of World War II are just now being reflected in college enrollments. There will be a large potential pool from which an adequate number of students well qualified for medical careers can be obtained if effort is made. This is a challenge to all of medicine.

Medical School Faculties

The preservation of high standards while expanding educational opportunities in medicine will require a proportionate expansion in teaching personnel. Elsewhere in this report are presented data pertinent to the number of existing faculty vacancies. While this is a substantial number, it has not increased proportionately as much in the past year as in previous years. Somewhat conflicting data regarding the opportunities, enrollments and graduates in the graduate degree program of the medical sciences are also presented. The expanding graduate degree and post doctoral fellowship programs give some assurance that there is a sufficient pool of potential teachers. However, there is a real need for an over-all evaluation of the size and character of this pool.

Research training and experience and research productivity is now most often the basis for full-time academic appointment on medical faculties.

Under appropriate conditions this system has much to commend it. The advancement of knowledge is one of the obligations of any institution of higher education and the imaginative curiosity that should characterize the investigator is an equally highly valued trait for a teacher. However, there may be reason to question the extent to which appropriate conditions do exist today.

Many individuals have expressed concern that the broad impact of the widespread project type research grant in the long view may not be beneficial to research itself or to the individual and educational institution involved. This concern is reflected in the recommendations of a recent NIH staff committee study.[7]

Commenting on this issue, Dr. Long[8] stated, ". . . there has been brought into science departments a large number of individuals for whom the university has no direct responsibility. . . . Since research under the terms of the grant must command their first loyalty, how can we expect them to participate in other educational activities of the department. . . . Two or three years postgraduate fellowship experience is essential for development of an independent investigator, but the emergence of a group of journeymen scientists does not seem . . . to be a happy consequence of our present system. . . .

". . . the medical schools and all branches of the university require not only investigators in their particular field, but also individuals who are capable of teaching the next generation. The present emphasis on research as the most important criteria for advancement, with the consequent development of a highly competitive character to research, has tended to obscure the importance of the teacher in the future of medical science. It would be well to remember that *research is a component of good teaching. . . .*" (emphasis supplied).

In the development and acquisition of full-time faculty for the expanded educational facilities, Dr. Long's comments should be given deliberate thought.

Medical School Curriculum

Expansion of the physical plant of medical education should be preceded by a careful study of the kind of an educational program the plant should house. During the past decade, many medical schools have reviewed their curricula and several institutions have established standing faculty committees charged with this as a continuing responsibility. In schools recently developed as well as in others long established, the unit student laboratory concept has gained wide acceptance. In at least two new schools, there have been included physical facilities for patients admitted for diagnostic work-up or patients in a convalescent stage, who require less than the usual full hospital care and more than the usual out-patient services.

These latter facilities should be conducive to approaching medicine as a study of the interaction of man and his environment in which medicine inevitably must draw to a greater extent on the social sciences as knowledge in these disciplines becomes more secure. The social implications of health and disease and, to the usual physician teacher or practitioner, the more immediately important implications of social components as either direct or contributory factors in health and disease are generally recognized and accepted. Though medical teaching now borrows from the social sciences, there is still much fumbling. Perhaps the major problem centers about the inability to bring social concepts into medical education as a viewpoint incorporated as a part of the attitude and philosophy of all medical teachers. As this evolves, it is likely that there will be a greater scientific base to what is now known as the art of medicine.

Medicine becomes more and more truly scientific as it relates the advancing knowledge of the fundamental sciences to biology. The rapid developments, particularly in nuclear physics and atomic energy, present impressive challenges to medicine and its related sciences. In order for medicine to capture all possible benefits from these areas of science, there must be available as teachers, researchers and students, individuals with a depth of knowledge in modern physics and chemistry and an interest and ability in relating new discoveries to medical ends. This whole area will surely have an increasing importance to and a greater role in medical education.

Many occurrences make it clear that the physician and medical teacher of tomorrow must be in his intellectual and clinical activities far more knowledgeable in the basic sciences and intimate with the laboratory and sociological areas. The background for this closer identification is already being acquired by increasingly large numbers of medical students who actively participate in research during the summer vacation period or during free or elective hours of the regular academic year.

The construction of new facilities should take these and other similar matters into account.

NEW DEVELOPMENTS IN MEDICAL SCHOOLS

Sixty medical schools in the United States and eight of the Canadian institutions reported developments of major interest during the past year. These developments are in such areas as administrative organization, curriculum planning and activation, and augmented financial resources. Readjustments in financing covered funds for salary increases for the faculty, for maintenance and operation, new equipment, construction, increased

resources for student loans and scholarships, changes in methods of selection of students, and additions to endowment resources.

Thirty-one schools in the United States and two in Canada reported changes of *administrative* organization. These vary from changes of key administrative personnel to major readjustments of departmental interrelationship. A student sponsor program has been initiated at George Washington University. Senior members of the faculty assume sponsorship of four students, one from each class. The students call on their advisor for help with various problems. The University of Miami has established a Medical School Council to develop contacts with representatives of the general public in a more intimate and active manner than is usual in a routine public relations program. The Council was organized to include 21 business and professional men of the community. Its organization includes four committees—public relations, long range development, finance, and physicians.

Vanderbilt University, with a grant from the Commonwealth Fund, has embarked on a study to evaluate the present status of the medical center and to formulate its goals for the future. The faculty has been engrossed in this study throughout the year. A pattern of close administrative coordination between the Texas Medical Center and Baylor University College of Medicine was accomplished during 1958-1959. Under this new arrangement, general policies for the medical school are developed by a Joint Administrative Committee, composed of three representatives from the Board of Trustees of the University, three from the Board of Directors of the Texas Medical Center, and a seventh public member. In effect, this has added four prominent citizens to the group which now most actively supervises the activities of the College of Medicine. Up to the present time, the Committee has concerned itself largely with matters having to do with financial support and establishment of affiliation arrangements.

A significant move has been the setting up of a Medical Center Planning Committee by the University of Saskatchewan. The new committee is made up of representatives of the Board of Governors of the University, the University Hospital Board, and the Department of Public Health of the Government of Saskatchewan. It has set for itself the task of redefining the goals of the medical center.

The Yale–New Haven Medical Center has been incorporated for the purpose of joint action of the Yale School of Medicine and the Grace–New Haven Community Hospital in those areas of the activities of the two institutions where there are mutual interests, such as public relations, long-term planning, and fund-raising. The university and the hospital will continue to be independent corporate entities and the university will continue to be responsible for teaching and research and the hospital for service. Funds received by the medical center will be distributed to the two institutions for the purposes stated and in accordance with the interests of the donors.

Through the efforts of the medical school administration, the Rockefeller Foundation allocated $50,000 to Boston University to design a curriculum suitable for the education of the doctor of tomorrow. This would include the courses that are now required for premedical as well as medical education. The so-called Rockefeller Plan has as its objective to combine the liberal arts and the medical programs of study into a single integrated unit extending over a six-year period, the improvement of the scientific background of the student, to strengthen the educational background of the medical student in the arts and humanities, the development of a scholarly mind, to improve the physician's understanding of the relationship of medicine to society and the duties of a doctor as a citizen, and to make him desire to assume the associated obligations and to increase the sense of responsibility of the doctor toward his patients, other doctors, and the various people with whom he works.

Fifteen medical schools in the United States and one in Canada indicated changes in procedures of *student selection*. The University of Miami, which has previously required a seven-year residence in Florida for admission to its classes, will admit students if they have legal residence in the state. This period has been set at one year by the state legislature. By the terms of the subsidy granted to the school by the state, 90% of the student body must be residents of the state. The definition of residence has been modified so that the medical school admission requirement is now the same as for other educational institutions operated by the state.

The faculty at the University of Chicago in the spring of 1959 recommended a change in the admissions requirements, as a result of which there will be a reduction in both the biology and chemistry requirements of applicants for admission in 1960 and thereafter. In particular, an applicant will not be required to have comparative anatomy, embryology, or qualitative chemical analysis to qualify for admission to the medical school beginning in 1960. The purpose of these changes in the admission requirements is not to reduce the science background of the medical applicants but rather to make the premedical science requirements less rigid so that prospective medical students can pursue a broader and more flexible program of studies in preparing for admission to medical school.

At the beginning of the school year, the first year class of medical students at the University of Washington was given tests for vocabulary and reading speed and comprehension. Those students scoring lowest in the test were given an opportu-

nity to take a remedial course which was financed by the School of Medicine and given with the cooperation of the College of Education of the University of Washington. A faculty committee of the University of Wisconsin has been dealing with the problem of improving methods of selecting and recruiting medical students. The committee has been active across the state in presenting programs for prospective students, parents, teachers, and advisors. In addition, similar programs have been presented in the medical center to acquaint these groups with the medical school's aims, needs and procedures.

There continues to be deep interest in *curriculum* modifications in keeping with the changing emphases on various aspects of medical education. The following material has been selected from the annual reports as illustrative of the dynamic thinking and action generally apparent in medical schools.

During the past two years, the entire curriculum of the medical school of Georgetown University has been restudied and replanned. In particular, the teaching activities of the first two years have been strongly coordinated and the didactic portion of the program in the third year no longer has departmental identification. The teaching in that year is done by means of interdepartmental conferences and panels. New courses have been introduced in growth and development and mechanisms of disease.

With construction of a new basic science building in Indianapolis, the first-year teaching program of Indiana University School of Medicine was moved from the main University Campus in Bloomington to Indianapolis. Beginning in September, 1959, the Indiana University initiated a new program in medical education utilizing the vacated facilities on the Bloomington campus as well as the teaching facilities of other departments of the university. This new venture is designed to permit carefully selected students to complete the first two years of medical study while at the same time continuing work in an academic field through the baccalaureate and master degree levels.

Since January, 1958, the chairman of the department of radiology of the University of Louisville has been on leave of absence to devote his full time to curriculum planning. Implementation of the changes proposed is contemplated in the near future. One of the changes proposed is to reduce the time allotted to the clinical clerkships in the senior year and to substitute for it more work of a purely academic nature in the realm of the humanities as well as in the more strictly scientific areas.

The Wayne State University College of Medicine, in cooperation with other colleges of the university, is embarking on two new programs of instruction which will require drastic alteration of their admission procedures. The first change will be necessitated by the adoption of the 2-4-2 plan of medical college organization. This plan, beginning with two years of liberal arts education, followed by four years of a joint curriculum including both liberal arts subjects and the basic sciences, and concluding with the two clinical years, will likely start next year. The second new program will result from the creation of a "general college" at the University organized around three synthesized areas—the natural sciences, the social sciences, and the humanities. This college, known as Monteith College, enrolled its first group in 1959, and the College of Medicine will tentatively commit 25 places in the first year class of 1963 to students at the time of their entry into the general college. These admissions are provisional and may be cancelled in the event of unsatisfactory collegiate performance. It is the medical college's intention to run these two groups of home-bred admissions alongside the usual out-of-institution and out-of-state groups routinely admitted by the usual procedures.

The State University of New York Downstate Medical Center has planned certain curriculum changes. One-half of a 12-month fourth year will be spent in a comprehensive, nondepartmentalized, combined inpatient and outpatient clerkship. Most of the clerkships in the third year will be given in the Kings County Hospital. The remaining clerkships in both the third and fourth years will be given in the voluntary affiliated hospitals of Brooklyn.

Study of the curriculum at the University of Rochester has resulted in a number of changes which will be introduced in 1959-1960. These include an introduction in the first year to the scholarly and social aspects of the physician's role. At the beginning of the third year there will be an introductory clerkship, taught interdepartmentally, in which emphasis will be placed on medical interviewing and physical examination. Instructors will work in pairs with a group of five students. All clinical departments will participate.

MEDICAL SCHOOLS

APPROVED MEDICAL SCHOOLS

Table 1 lists by states the approved four-year medical schools and schools of basic medical sciences, showing for each school public or private ownership, year of organization, tuition charges, enrollment by class, and other basic data. Similar data are presented in the same table for the newly developing schools now provisionally approved on the basis of implementation of the first two years of the program. Table 2 portrays similar data for the 12 approved medical schools in Canada.

In 1958-1959, Albert Einstein College of Medicine graduated its first medical class and became a fully approved four-year school. This increases the

TABLE 1.—*Approved Medical Schools and Schools of the Basic Medical Sciences in the United States*

State	No.		Ownership	Year Organized	Tuition: Resident	Tuition: Nonresident	Premedical Requirement by Year	Students by Classes, 1958-1959 (Full-time, Part-time and Special Students Included): 1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	Total	Graduates 7/1/58 to 6/30/59		
Ala.	1	Medical College of Alabama, Birmingham	Pub.	1859	445.00	845.00	3	81	80	71	65	297	64	Robert C. Berson, M.D., Dean	1
Ark.	2	University of Arkansas School of Medicine, Little Rock	Pub.	1879	500.00	1,000.00	3	95	85	89	70	339	69	F. Douglas Lawrason, M.D., Dean	2
Calif.	3	College of Medical Evangelists, Loma Linda, Los Angeles	Pri.	1909	1,250.00	1,250.00	3	114	91	86	80	371	81	Walter E. Macpherson, M.D., Dean	3
	4	University of California School of Medicine, Los Angeles	Pub.	1951	386.00	786.00	3	56	54	51	47	208	46	Stafford L. Warren, M.D., Dean	4
	5	University of Southern California School of Medicine, Los Angeles	Pri.	1885	1,120.00	1,120.00	3	68	62	64	66	260	66	Clayton G. Loosli, M.D., Dean	5
	6	Stanford University School of Medicine, Palo Alto	Pri.	1908	1,005.00	1,005.00	3	61	62	58	56	237	57	Robert H. Alway, M.D., Dean	6
	7	University of California School of Medicine, San Francisco	Pub.	1864	385.00	735.00	3	101	74	83	80	338	80	John B. deC. Saunders, M.D., Dean	7
Colo.	8	University of Colorado School of Medicine, Denver	Pub.	1883	655.00	1,055.00	3	86	76	72	83	317	81	Robert J. Glaser, M.D., Vice President and Dean	8
Conn.	9	Yale University School of Medicine, New Haven	Pri.	1812	1,175.00	1,175.00	3	81	81	75	79	316	79	Vernon W. Lippard, M.D., Dean	9
D.C.	10	Georgetown University School of Medicine, Washington	Pri.	1851	1,260.00	1,260.00	3 or 4	112	96	103	93	404	93	Hugh H. Hussey, M.D., Dean	10
	11	George Washington University School of Medicine, Washington	Pri.	1825	1,000.00	1,000.00	3	101	97	100	91	389	91	John L. Parks, M.D., Dean	11
	12	Howard University College of Medicine, Washington	Pri.	1868	591.75	591.75	3	105	86	69	77	337	75	Robert S. Jason, M.D., Dean	12
Fla.	13	University of Miami School of Medicine, Coral Gables	Pri.	1952	800.00	1,500.00	3	75	73	55	59	262	59	Homer F. Marsh, Ph.D., Dean	13
Ga.	14	Emory University School of Medicine, Emory University	Pri.	1854	1,000.00	1,000.00	3	74	70	74	66	284	65	Arthur P. Richardson, M.D., Dean	14
	15	Medical College of Georgia, Augusta	Pub.	1828	455.00	None	3	102	91	87	90	370	88	Harry B. O'Rear, M.D., Dean	15
Ill.	16	Chicago Medical School	Pri.	1912	1,070.00	1,070.00	4	72	68	67	67	274	68	John J. Sheinin, M.D., President	16
	17	Northwestern University Medical School, Chicago	Pri.	1859	1,050.00	1,050.00	3	132	122	131	136	521	133	Richard H. Young, M.D., Dean	17
	18	Stritch School of Medicine of Loyola University, Chicago	Pri.	1915	950.00	950.00	3	88	80	84	88	340	86	John F. Sheehan, M.D., Dean	18
	19	University of Chicago, The School of Medicine	Pri.	1927	1,060.00	1,060.00	3	73	74	73	70	290	69	Lowell T. Coggeshall, M.D., Dean, Division of Biological Sciences	19
	20	University of Illinois College of Medicine, Chicago	Pub.	1881	343.50	763.50	3	201	180	170	156	707	153	Granville A. Bennett, M.D., Dean	20
Ind.	21	Indiana University School of Medicine, Indianapolis	Pub.	1903	430.00	750.00	3	160	148	138	139	585	140	John D. Van Nuys, M.D., Dean	21
Iowa	22	State University of Iowa College of Medicine, Iowa City	Pub.	1850	400.00	800.00	3	120	110	108	99	437	100	Norman B. Nelson, M.D., Dean	22
Kans.	23	University of Kansas School of Medicine, Lawrence, Kansas City	Pub.	1905	475.00	925.00	4	98	100	102	102	402	101	W. Clarke Wescoe, M.D., Dean	23
Ky.	24	University of Louisville School of Medicine	Pri.	1837	900.00	1,300.00	3	100	92	91	87	370	86	J. Murray Kinsman, M.D., Dean	24
La.	25	Louisiana State University School of Medicine, New Orleans	Pub.	1931	120.00	520.00	3	129	105	99	110	443	110	William W. Frye, M.D., Dean	25
	26	Tulane University School of Medicine, New Orleans	Pri.	1834	1,110.00	1,110.00	3	134	121	120	119	494	118	Maxwell E. Lapham, M.D., Dean	26
Md.	27	Johns Hopkins University School of Medicine, Baltimore	Pri.	1893	1,280.00	1,280.00	Year 1: 2 or 3 Year 2: Degree	74	72	68	68	282	68	Thomas B. Turner, M.D., Dean	27
	28	University of Maryland School of Medicine & College of Physicians and Surgeons, Baltimore	Pub.	1807	786.00	936.00	3	100	95	85	83	363	83	William S. Stone, M.D., Dean	28
Mass.	29	Boston University School of Medicine	Pri.	1873	1,200.00	1,200.00	4	74	71	75	65	285	66	Chester S. Keefer, M.D., Dean	29
	30	Harvard Medical School, Boston	Pri.	1783	1,068.00	1,068.00	2	114	110	144	148	516	147	George Packer Berry, M.D., Dean	30
	31	Tufts University School of Medicine, Boston	Pri.	1893	1,215.00	1,215.00	3	114	110	104	104	432	104	Joseph M. Hayman Jr., M.D., Dean	31
Mich.	32	University of Michigan Medical School, Ann Arbor	Pub.	1850	550.00	980.00	3	197	180	178	189	744	186	William N. Hubbard, M.D., Dean	32
	33	Wayne State University College of Medicine, Detroit	Pub.	1885	552.00	981.00	3	125	73	64	66	328	66	Gordon H. Scott, Ph.D., Dean	33
Minn.	34	University of Minnesota Medical School, Minneapolis	Pub.	1883	505.00	945.00	3	139	123	126	116	504	113	Robert B. Howard, M.D., Dean	34
Miss.	35	University of Mississippi School of Medicine, Jackson	Pub.	1903	600.00	825.00	3	78	68	64	62	272	62	David S. Pankratz, M.D., Dean	35
Mo.	36	University of Missouri School of Medicine, Columbia	Pub.	1840	355.00 to 498.00	None	3	76	69	59	30	234	31	Vernon E. Wilson, M.D., Dean	36
	37	Saint Louis University School of Medicine	Pri.	1903	1,000.00	1,000.00	3	126	109	100	116	451	116	James W. Colbert Jr., M.D., Dean	37
	38	Washington University School of Medicine, St. Louis	Pri.	1899	924.00	924.00	3	86	83	85	88	342	88	Edward W. Dempsey, M.D., Dean	38
Neb.	39	Creighton University School of Medicine, Omaha	Pri.	1892	1,012.00	1,012.00	3	77	64	66	70	277	70	Richard L. Egan, M.D., Dean	39
	40	University of Nebraska College of Medicine, Omaha	Pub.	1881	525.00	765.00	3	81	75	84	72	312	72	James P. Tollman, M.D., Dean	40
N.Y.	41	Albany Medical College of Union University	Pri.	1839	1,012.00	1,012.00	3	65	59	54	51	229	51	Harold C. Wiggers, Ph.D., Dean	41
	42	University of Buffalo School of Medicine	Pri.	1846	1,080.00	1,080.00	3	88	76	66	70	300	70	Ernest Witebsky, M.D., Dean	42
	43	Albert Einstein College of Medicine of Yeshiva University, New York City	Pri.	1955	1,050.00	1,050.00	4	96	95	91	50	332	50	Marcus D. Kogel, M.D., Dean	43
	44	Columbia University College of Physicians and Surgeons, New York City	Pri.	1767	1,183.00	1,183.00	3	120	121	118	118	477	117	H. Houston Merritt, M.D., Dean	44
	45	Cornell University Medical College, New York City	Pri.	1898	1,250.00	1,250.00	4	86	81	88	82	337	82	John E. Dietrick, M.D., Dean	45
	46	New York Medical College, Flower & Fifth Avenue Hospitals, New York City	Pri.	1860	1,200.00	1,200.00	4	127	128	118	123	496	123	Ralph E. Snyder, M.D., President and Dean	46

	47	New York University College of Medicine, New York City	Pri.	1841	1,217.00	1,217.00	3	132	130	133	131	526	132	Donal Sheehan, M.D., Dean	47
	48	State University of New York, Downstate Medical Center, New York City	Pub.	1860	715.00	715.00	3	154	135	141	140	570	138	Robert A. Moore, M.D., President and Dean	48
	49	University of Rochester School of Medicine and Dentistry	Pri.	1920	1,275.00	1,275.00	3	69	70	60	63	262	68	Donald G. Anderson, M.D., Dean	49
	50	State University of New York, Upstate Medical Center, Syracuse	Pub.	1834	715.00	715.00	3	87	73	75	67	302	65	Carlyle Jacobsen, Ph.D., Dean	50
N.C.	51	University of North Carolina School of Medicine, Chapel Hill	Pub.	1879	671.00	1,271.00	3	70	64	70	60	264	59	W. Reece Berryhill, M.D., Dean	51
	52	Duke University School of Medicine, Durham	Pri.	1930	1,200.00	1,200.00	3	79	75	76	81	311	78	Wilburt C. Davison, M.D., Dean	52
	53	Bowman Gray School of Medicine of Wake Forest College, Winston-Salem	Pri.	1902	900.00	900.00	3	55	53	51	48	207	47	Coy C. Carpenter, M.D., Dean	53
Ohio	54	University of Cincinnati College of Medicine	Pub.	1819	750.00	950.00	3	92	82	89	79	342	79	Stanley E. Dorst, M.D., Dean	54
	55	Western Reserve University School of Medicine, Cleveland	Pri.	1843	1,000.00	1,000.00	3 (4 Preferred)	78	80	88	75	321	72	Douglas D. Bond, M.D., Dean	55
	56	Ohio State University College of Medicine, Columbus	Pub.	1914	630.00	None	4 Years or Arts—Med.	151	141	136	141	569	140	Charles A. Doan, M.D., Dean	56
Okla.	57	University of Oklahoma School of Medicine, Oklahoma City	Pub.	1900	500.00	1,000.00	3	100	92	87	92	371	93	Mark R. Everett, Ph.D., Dean	57
Ore.	58	University of Oregon Medical School, Portland	Pub.	1887	603.00	906.00	3	80	73	69	73	295	66	D. W. E. Baird, M.D., Dean	58
Pa.	59	Hahnemann Medical College and Hospital of Philadelphia	Pri.	1848	922.00	922.00	3	109	97	94	93	393	93	Charles S. Cameron, M.D., Dean	59
	60	Jefferson Medical College of Philadelphia	Pri.	1825	982.76	982.76	3	175	164	171	167	677	166	William A. Sodeman, M.D., Dean	60
	61	Temple University School of Medicine, Philadelphia	Pri.	1901	950.00	950.00	3	136	129	124	118	507	115	Robert M. Bucher, M.D., Dean	61
	62	University of Pennsylvania School of Medicine, Philadelphia	Pri.	1765	1,100.00	1,100.00	3	126	122	132	126	506	125	John McK. Mitchell, M.D., Dean	62
	63	Woman's Medical College of Pennsylvania, Philadelphia	Pri.	1850	1,075.00	1,075.00	3 (4 Preferred)	51	46	42	41	180	41	Marion Fay, Ph.D., Dean	63
	64	University of Pittsburgh School of Medicine	Pri.	1883	1,096.00	1,096.00	3	101	98	96	83	378	80	Francis S. Cheever, M.D., Dean	64
Puerto Rico	65	University of Puerto Rico School of Medicine, San Juan	Pub.	1949	558.00	558.00	3	55	48	45	45	193	43	Jose R. Vivas, M.D., Dean	65
S.C.	66	Medical College of South Carolina, Charleston	Pub.	1823	592.50	No Nonresident Freshmen	3	80	73	73	73	299	74	John T. Cuttino, M.D., Dean	66
Tenn.	67	University of Tennessee College of Medicine, Memphis	Pub.	1851	567.00	912.00	3	202	189	136	131	658	173	Maston Kennerly Callison, M.D., Dean	67
	68	Meharry Medical College, Nashville	Pri.	1876	794.00	794.00	3	74	59	68	68	269	67	Daniel T. Rolfe, M.D., Dean	68
	69	Vanderbilt University School of Medicine, Nashville	Pri.	1873	1,010.00	1,010.00	Bachelor's Degree or Senior in Absentia	52	51	48	48	199	48	John W. Patterson, M.D., Dean	69
Tex.	70	University of Texas Southwestern Medical School, Dallas	Pub.	1943	360.00	360.00	4	101	98	104	94	397	91	Atticus J. Gill, M.D., Dean	70
	71	University of Texas Medical Branch, Galveston	Pub.	1887	350.00	None	4	143	112	142	132	529	132	Kenneth M. Earle, M.D., Dean	71
	72	Baylor University College of Medicine, Houston	Pri.	1900	997.50	997.50	3	84	84	69	73	310	73	Stanley W. Olson, M.D., Dean	72
Utah	73	University of Utah School of Medicine, Salt Lake City	Pub.	1905	480.00	830.00	3	57	55	46	48	206	48	Philip B. Price, M.D., Dean	73
Vt.	74	University of Vermont College of Medicine, Burlington	Pub.	1822	550.00	1,500.00	4 and a Bachelor's Degree	51	50	44	40	185	40	George A. Wolf, M.D., Dean	74
Va.	75	University of Virginia School of Medicine, Charlottesville	Pub.	1825	514.00	964.00	3	76	71	68	66	281	68	Thomas H. Hunter, M.D., Dean	75
	76	Medical College of Virginia, Richmond	Pub.	1838	671.00	1,021.00	3	85	78	96	95	354	94	William F. Maloney, M.D., Dean	76
Wash.	77	University of Washington School of Medicine, Seattle	Pub.	1945	438.00	768.00	3	75	74	73	69	291	68	George N. Aagaard, M.D., Dean	77
Wis.	78	University of Wisconsin Medical School, Madison	Pub.	1907	380.00	730.00	3	101	93	75	71	340	71	John Z. Bowers, M.D., Dean	78
	79	Marquette University School of Medicine, Milwaukee	Pri.	1913	950.00	950.00	3	105	87	93	95	380	95	John S. Hirschboeck, M.D., Dean	79
		Totals						7,848	7,186	7,071	6,872	28,977	6,860		
		Approved Schools of Basic Medical Sciences													
N.H.	1	Dartmouth Medical School, Hanover	Pri.	1797	1,400.00	1,400.00	3	24	24	...	...	48		Rolf C. Syvertsen, M.D., Dean	1
N.D.	2	University of North Dakota School of Medicine, Grand Forks	Pub.	1905	206.00	476.00	3	41	34	...	...	75		Theodore H. Harwood, M.D., Dean	2
S.D.	3	State University of South Dakota School of Medicine, Vermillion	Pub.	1907	436.00	736.00	3	44	35	...	...	79		Walter L. Hard, Ph.D., Dean	3
W.Va.	4	West Virginia University School of Medicine, Morgantown	Pub.	1902	316.00	752.00	3	41	33	...	...	74		Edward J. Van Liere, M.D., Dean	4
		Totals						150	126	...	...	276			
		Schools Developing New Programs*													
Fla.	1	University of Florida College of Medicine, Gainesville	Pub.	1956	600.00	1,200.00	4	50	47	40	...	137		George T. Harrell, M.D., Dean	1
N.J.	2	Seton Hall College of Medicine and Dentistry, Jersey City	Pri.	1956	950.00	950.00	3	80	73	71	...	224		Charles L. Brown, M.D., Dean	2
		Totals						130	120	111	...	361			
		Grand Totals						8,128	7,432	7,182	6,872	29,614			

* Provisionally approved on the basis of full implementation of the first two years' program.
1. Nonresidents of other approved medical schools are considered for advanced standing. The nonresident tuition and fees are $755.
2. Covers fees. There is no tuition.
3. Nonresidents of other approved medical schools are considered for advanced standing. Fees are $1592.50.

number of approved four-year schools in full operation to 79. Two newly developing schools, University of Florida College of Medicine and Seton Hall College of Medicine and Dentistry, had third-year students for the first time in 1958-1959. With classes first graduating in 1959-1960, those two schools will increase the number of fully operational approved four-year medical schools to 81. There remains four two-year schools of basic medical sciences. West Virginia University expects to enroll its third-year class for the first time in the 1960-1961 academic year. The University of Kentucky medical school expects to enroll first year medical students for the first time in 1960.

The 12 approved Canadian medical schools all present a full four-year program.

Construction Completed.—Major projects completed during the year by 25 medical schools in the United States totaled $70,305,429. Construction included 12 new facilities or expansion and/or renovation of old facilities primarily for research, 9 primarily for teaching, 9 clinical facilities, and 4 dormitories. New basic science buildings were completed by Howard, Michigan, and Southwestern. The University of Florida completed construction of its teaching hospital in October, 1958, and the University Hospital at Seattle, started in 1956, was partially completed and occupied in March, 1959, with total completion scheduled for October, 1959.

Construction Initiated.—Twenty-seven medical schools initiated major projects estimated at

TABLE 2.—*Approved*

Province		Approved Medical Schools	Year Organized	Tuition		Premedical Requirement*
				Resident	Nonresident	
Alta.	1	University of Alberta Faculty of Medicine, Edmonton	1913	[383.25 (1st yr.) 503.25 (2nd yr.) 553.25 (3-4-yrs.)	Same	3
B.C.	2	University of British Columbia School of Medicine, Vancouver	1949	545.00	Same	3
Man.	3	University of Manitoba Faculty of Medicine, Winnipeg	1883	531.00	Same	3
N.S.	4	Dalhousie University Faculty of Medicine, Halifax	1867	531.00	731.00	3
Ont.	5	Queen's University Faculty of Medicine, Kingston	1854	[430.00 A† 545.00 B	Same	1‡
	6	University of Western Ontario Faculty of Medicine, London	1881	625.00	Same	3
	7	University of Ottawa Faculty of Medicine, Ottawa	1945	559.00	859.00	1‡
	8	University of Toronto Faculty of Medicine, Toronto	1843	[591.50 (1-2-3 yrs.) 601.50 (4th yr.)	Same	1‡§
Que.	9	McGill University Faculty of Medicine, Montreal	1828	750.00	Same	3§
	10	University of Montreal Faculty of Medicine, Montreal	1843	545.00	630.00	Degree
	11	Laval University Faculty of Medicine, Quebec	1852	520.00	Same	Degree
Sask.	12	University of Saskatchewan College of Medicine, Saskatoon	1926	[475.00 (1st yr.) 525.00 (2-3-4 yrs.)	Same	3
		Totals				

* Number of premedical years required after Junior matriculation in high school for admission to medical school.
† A, premedicine; B, medicine.
‡ In the case of Queen's, Ottawa, and Toronto, where years of premedical college work is under the Faculty of Medicine in addition to the four years of medical school itself, the figure given admits to the first premedical college year of the faculty. To enter the four-year medical school program directly, two years of college are needed in addition to the figure given.

CONSTRUCTION OF FACILITIES

The annual reports from the medical schools indicate that during 1958-1959, 56 institutions in the United States and 5 in Canada initiated, completed, or have funds committed for construction and equipment of new facilities. Table 3 summarizes this information. This study indicates that there has been a significant decrease since last year[9] in estimated costs for projects initiated or planned, although there was a definite increase in the expenditures for completed construction. The number of institutions in the United States engaged in expansion of their facilities was fewer by four as compared with results published last year. The number of institutions in Canada remained the same. In the United States, 27 schools indicated the initiation of 35 construction projects, 25 schools completed construction of 39 projects, and 31 schools have funds committed for construction of 40 projects with construction to begin in 1959-1960.

approximately 54 million dollars for construction and 5 million dollars for equipment. Construction initiated includes 20 new facilities or expansion and/or renovation of old facilities primarily for research, 5 primarily for teaching, 6 clinical facilities, and 2 dormitories. The University of California at Los Angeles has initiated construction of a neuropsychiatric institute to house the clinical, teaching, and research facilities for the Department of Psychiatry and the Divisions of Neurology, Neurosurgery, and Neuropathology. Teaching and research buildings have been initiated by Dartmouth, Bowman Gray, North Dakota, University of Pennsylvania, Woman's, and Washington University.

Construction Planned for 1959-1960.—Major projects planned for initiation in 1959-1960 with funds already committed is estimated at approximately 49 million dollars for construction and 5 million dollars for equipment. Such construction is being planned by 31 schools and includes 21 new facilities or expansion and/or renovation of old facilities primarily for research, 8 primarily

for teaching, 4 clinical facilities, and 2 student dormitories. University of California at Los Angeles will begin construction of a Nuclear Medicine Building to provide permanent and more adequate quarters for the fundamental and applied medical research programs. The new building will permit programs which have to do with radiation effects and atomic medicine to expand their graduate student complement. Clinical research buildings are in the planning stage at the University of Chicago, University of Kansas, Louisville, Tulane, North Carolina, Oregon, Tennessee, Vanderbilt, and Baylor. A rehabilitation and ambulatory diagnostic patient facility will be constructed by the University of Rochester, while Duke is embarking on the construction of a center for the study of aging. The University of Nebraska has completed plans for a patient service, teaching and research building.

In Canada, Queen's University completed a clinical teaching and research building and Laval completed its basic science building. Alberta has initiated a substantial addition to its medical school building and British Columbia has funds committed for construction of a new medical sciences building.

There are other groups and institutions that have indicated varying degrees of interest and activity directed toward the development of additional medical schools. The incidence and timing of actual future establishment of new schools cannot be predicted.

The Council on Medical Education and Hospitals in collaboration with the Association of American Medical Colleges makes every effort to be of as much assistance as possible to those groups and institutions which contemplate development of new schools of medicine. Consultative visits to St. Paul, Minnesota, and Albuquerque, New Mexico, will be made in regard to the possible establishment of new educational facilities at those sites.

Medical Schools in Canada

1st Pre-medical Year	2nd Pre-medical Year	1st Year	2nd Year	3rd Year	4th Year	Required Intern Year	Total	Graduates 5-1-58 to 6-30-59		
...	...	54	57	52	54	...	217	50	Walter C. MacKenzie, M.D., Dean	1
...	...	57	49	60	47	...	213	44	John F. McCreary M.D., Dean	2
...	...	51	56	55	56	...	218	55	Lennox G. Bell, M.D., Dean	3
...	...	60	58	51	52	50	221¶	52	C. B. Stewart, M.D., Dean	4
52	51	63	53	54	56	...	226¶	56	G. H. Ettinger, M.D., Dean	5
...	...	60	60	54	54	...	228	51	James B. Collip, M.D., Dean	6
18	32	68	63	52	56	...	239¶	55	Jean-Jacques Lussier, M.D., Dean	7
128	118	163	152	139	147	...	601¶	147	J. A. MacFarlane, M.D., Dean	8
...	...	110	103	98	107	...	418	98	Lloyd G. Stevenson, M.D., Dean	9
...	...	142	102	112	102	...	458	97	Wilbrod Bonin, M.D., Dean	10
...	...	124	128	109	141	125	502¶	124	Jean-Baptiste Jobin, M.D., Dean	11
...	...	34	30	31	32	...	127	30	J. Wendell Macleod, M.D., Dean	12
198	201	986	911	867	904	173	3,668¶	859		

§ Degree in arts and sciences if college work is taken elsewhere.
‖ A very definite preference is given to those who have baccalaureate degrees.
¶ Intern and premedical figures not included.

POTENTIAL SITES FOR NEW MEDICAL SCHOOLS

In a recent session the legislature of the State of Texas authorized the establishment of a new four-year medical school in San Antonio. The new school will be a part of the University of Texas, which is presently engaged in studies directed toward determination of the most appropriate location for the new institution. Although the school will be an integral part of the University, the legislature indicated that the community of San Antonio will be expected to provide the necessary clinical facilities.

MEDICAL SCHOOL EXPENDITURES

Information regarding the financing of medical school activities is presented again on the same basis as in last year's report. Figures given in table 4 may be compared with those in table 15 in 1958 report on Medical Education in the United States and Canada but they cannot and should not be compared with what appeared to be somewhat similar data in earlier reports because current data have an entirely different base.

Mr. A. J. Carroll, Business Officer, State University of New York Upstate Medical Center is now engaged in a cost accounting study of all medical schools. This study is designed to relate on a uniform basis medical school expenditures to the specific programs supported. The study is being conducted under the auspices of the Association of American Medical Colleges with support from the Kellogg Foundation. When the results of Carroll's study are reported, for the first time there will be available an accurate accounting of medical school

expenditures, the costs of the various programs supported and the sources of the funds expended.

It is necessary to emphasize again the defects and limitations of the data presented in table 4. The greatest doubt as to accuracy in reflecting grand totals of actual and estimated expenditures rests in the lack of uniform accounting practices and terminology. For example, there is no generally accepted method of accounting for direct costs of patient care in teaching hospitals. Without question, in certain instances some such costs are included, and in others they are not a part of the individual school expenditures that are reflected in these totals.

When these data were presented a year ago, readers were cautioned that because of varying accounting practices, the data could be broken down to indicate with any validity the percentage of total expended funds that originated in any listed source. Despite this warning, organizations and individuals that should know better did utilize the data to purport to present the per cent of total medical school expenditures which were received from state appropriations, general university funds, tuition and fees and overhead on grants, etc.

TABLE 3.—*Estimates of Costs for Construction of Facilities in United States and Canada, 1958-1959*

	No. of Schools	Estimated Construction Cost*	Estimated Equipment Cost	Total
United States				
Construction Initiated	27	$53,524,132	$5,186,389	$58,710,521
Construction Completed	25	63,044,731	7,260,698	70,305,429
Construction Planned†	31	48,867,545	5,165,805	53,033,350
Canada				
Construction Initiated	3	2,690,735	717,000	3,407,735
Construction Completed	3	1,353,772	422,605	1,776,377
Construction Planned	2	2,810,500	153,000	2,963,500

* A few schools reported equipment costs as part of construction costs.

† Funds already committed and construction planned for 1959-1960.

As was pointed out before, all medical schools receive funds from students as payment for tuition and fees, yet 27 schools report no funds expended from this item. In almost all of these 27 institutions, student fees and tuition are reported under such other sources as general university funds, or state appropriation. The same situation prevails particularly for funds reported under the sources of state appropriation, general university funds and overhead on grants. Funds secured from these sources are reported as expended under any one of three or four different sources depending on the individual school's accounting practices. Furthermore any given school's practices may vary from year to year as attested by the differences on the numbers of schools indicating funds expended from specific sources between this report and that of a year ago.

A comparison of total expenditures for 1957-1958 with those of the previous year shows an increase of 17% (approximately 40 million dollars) which is just slightly higher than was anticipated in the estimate made at the time. Expenditures for the academic year 1958-1959 are presently estimated to increase by 11% to a total of 311 million dollars.

The total actual expenditure for the median four year school for 1957-1958 was $2.795 million. This represents an increase in funds expended by the median four year school of approximately $400,000 since last year. The total estimated expenditure for the median four year school for 1958-1959 is $3.220 million.

It seems pertinent to re-emphasize that data presented for medical school expenditures in terms of present knowledge cannot be translated into costs of educating medical students—or indeed any other

TABLE 4.—*Medical School Expenditures (United States)**

Source of Funds	Number of Schools Reporting Item	Actual Expenditures 1957-1958	Number of Schools Reporting Item	Estimated Expenditures 1958-1959
(a) Federal Grants for Research	85	$ 59,313,527.86	85	$ 70,247,770.06
(b) Non-government Gifts and Grants for Research	85	33,119,441.75	85	35,794,908.31
Sub-total items (a) and (b)		92,432,969.61		106,042,678.37
(c) Federal Grants for Teaching (include both institutional and individual grants)	83	14,530,648.75	83	18,258,345.12
(d) Non-government gifts and grants for teaching (include both institutional and individual gifts and grants)	68	7,466,034.94	69	8,050,272.60
Sub-total Items (c) and (d)		21,996,683.69		26,308,617.72
(e) Unrestricted gifts and grants	57	6,331,464.45	56	6,689,335.55
(f) State, County or City Appropriation for defrayal of medical school expenses	35	34,535,897.12	36	37,866,674.63
(g) State, County or City subsidies paid to the university or medical school as partial reimbursement for medical college costs	18	4,364,410.50	15	4,324,631.97
(h) General University funds	55	41,362,854.16	55	44,686,161.68
(i) Endowment Income	51	17,513,786.12	51	18,522,494.61
(j) Tuition and Fees	58	17,708,341.30	57	18,577,029.35
(k) Overhead on Grants	48	5,223,188.56	49	6,310,395.79
(l) Teaching expenses (faculty and supporting staff, salaries, and related supplies and expenses) paid by hospitals, clinics, etc.	36	17,313,485.90	34	17,708,540.04
(m) Teaching expenses paid from medical service funds	16	5,523,164.31	17	6,932,040.15
(n) Actual or estimated costs of services and expenses provided to Medical College by the university without charge (administrative, buildings and grounds, library, student health and other services)	33	10,528,900.16	32	12,295,088.91
(o) Other	27	4,642,874.73	26	4,744,940.95
Sub-total items (e) through (o)		165,048,367.31		178,657,333.63
Total items (a) through (o)	85	279,478,020.61	85	311,008,624.72

* See accompanying text for defects and limitations of these data.

single function of medical schools. These meaningful interpretations will be possible only when there is available a uniform, functional cost accounting system such as is under study by Carroll.

Canadian schools' expenditures are not presented since the returns were not complete for this information.

TEACHING RESPONSIBILITIES OF MEDICAL SCHOOL FACULTIES FOR OTHER THAN MEDICAL STUDENTS

Table 5 portrays by school and category of student the teaching responsibilities of faculties of medicine for students other than medical students in 1958-1959. The total of 85,459 is almost three

TABLE 5.—*Teaching Responsibilities for*

		Undergraduates or Basic Professional Enrollment						Professional Enrollment		
	Medical Schools in the United States	Dental Students	Pharmacy Students	Nurses	Technical Students	Arts and Science Majors	Other	Interns	Residents	Postgraduate Continuation Students[1]
1	Medical College of Alabama	103	..	155	61	..	31	28	85	21
2	University of Arkansas School of Medicine	..	..	..	35	..	..	38	69	..
3	College of Medical Evangelists	119	..	40	83	..	..	179	279	115
4	University of California School of Medicine, Los Angeles	..	..	183	21	20	82	26	133	3,500
5	University of Southern California School of Medicine, Los Angeles	..	120	..	120	75	.	152	192	3,100
6	Stanford University School of Medicine	..	..	99	75	..	..	44	182	250
7	University of California School of Medicine, San Francisco	289	281	173	50	..	..	45	236	3,000
8	University of Colorado School of Medicine	..	..	200	13	21	..	60	210	3,955
9	Yale University School of Medicine	..	..	19	6	..	..	53	160	126
10	Georgetown University School of Medicine	357	..	192	..	..	37	14	104	..
11	George Washington University School of Medicine	..	40	..	9	199	..	25	56	14
12	Howard University College of Medicine	247	132	25	23	3	9	15	45	7
13	University of Miami School of Medicine	..	..	278	24	..	..	64	210	..
14	University of Florida College of Medicine	..	..	..	..	..	83	3	12	2
15	Emory University School of Medicine	83	..	30	24	..	38	63	185	13
16	Medical College of Georgia	..	..	..	2	..	6	4	109	4
17	Chicago Medical School	..	..	..	..	..	..	20	28	..
18	Northwestern University Medical School	..	..	175	32	..	..	19	174	105
19	Stritch School of Medicine of Loyola University	..	..	..	..	..	47	10	34	..
20	University of Chicago, The School of Medicine	..	..	..	..	..	..	36	146	2
21	University of Illinois College of Medicine	250	200	61	22	..	..	63	259	..
22	Indiana University School of Medicine	149	..	304	68	..	..	12	142	910
23	State University of Iowa College of Medicine	137	116	203	99	505	35	20	160	619
24	University of Kansas School of Medicine	1	..	116	32	68	..	21	121	5,623
25	University of Louisville School of Medicine	223	..	252	24	..	86	21	96	5
26	Louisiana State University School of Medicine	..	..	54	24	..	18	51	297	322
27	Tulane University School of Medicine	..	..	285	..	..	..	100	175	422
28	Johns Hopkins University School of Medicine	..	..	250	..	..	..	87	222	134
29	University of Maryland School of Medicine and College of Physicians and Surgeons	..	55	60	..	..	..	32	136	215
30	Boston University School of Medicine	..	..	76	15	131	..	17	121	12
31	Harvard Medical School	30	..	..	..	..	..	70	460[2]	463[2]
32	Tufts University School of Medicine	200	..	..	..	..	..	57	124	30
33	University of Michigan Medical School	95	33	140	75	50	281	51	329	2,441
34	Wayne State University College of Medicine	..	..	..	15	..	..	61	150	202
35	University of Minnesota Medical School	282	24	91	454	356	..	33	211	1,230
36	University of Mississippi School of Medicine	..	..	50	18	..	..	24	32	364
37	University of Missouri School of Medicine	..	..	207	4	81	775	..	27	..
38	Saint Louis University School of Medicine	213	..	225	283	..	..	1	72	5
39	Washington University School of Medicine	..	..	..	..	..	42	61	195	91
40	Creighton University School of Medicine	90	..	115	7	..	..	13	27	..
41	University of Nebraska College of Medicine	..	..	35	19	..	..	11	51	..
42	Dartmouth Medical School	..	..	162	36	7	..	16	65	1
43	Seton Hall College of Medicine and Dentistry	81	..	..	..	..	..	67	96	..
44	Albany Medical College of Union University	2	..	237	4	..	31	43	89	116
45	University of Buffalo School of Medicine	120	125	180	40	8	..	49	130	404
46	Albert Einstein College of Medicine of Yeshiva University	..	..	200	36	..	38	37	208	..
47	Columbia University College of Physicians and Surgeons	150	..	349	86	..	198	24	256	813
48	Cornell University Medical College	..	..	210	..	..	..	72	280	7
49	New York Medical College, Flower and Fifth Avenue Hospitals	..	..	136	..	..	..	113	169	43
50	New York University College of Medicine	160	..	450	..	12	..	55	407	1,620

1. Approximate annual enrollment at regularly presented short courses, seminars, and lectures. Undoubtedly, a considerable amount of duplication of individuals appears.
2. Count incomplete. Year did not end until Aug. 31, 1959.
3. Clinical subjects only.

times the total number of medical students (29,614) and is 32% higher than the figure reported by and estimated for the schools one year ago. The Council has more faith in the validity of the figures for this year for other teaching responsibilities than it has had in previous years. As has been pointed out in the two previous years, schools benefit in terms of budgetary support and understanding by presenting as fully as possible the true extent of their total teaching responsibilities.

It should be noted that, except for dental students, interns, and residents, other students do not require from faculty members the same expenditure of energy and time as do medical students. For

Other than Medical Students, 1958-1959

		Undergraduates or Basic Professional Enrollment						Professional Enrollment		
		Dental Students	Pharmacy Students	Nurses	Technical Students	Arts and Science Majors	Other	Interns	Residents	Postgraduate Continuation Students[1]
51	State University of New York Downstate Medical Center, New York City	..	..	..	..	..	..	129	254	1,200[4]
52	University of Rochester School of Medicine and Dentistry	..	..	230	19	123	100	51	124	9
53	State University of New York Upstate Medical Center, Syracuse	..	..	..	..	..	..	34	121	675
54	University of North Carolina School of Medicine	193	122	200	49	16	120[5]	138	118	595[6]
55	Duke University School of Medicine	..	..	327	46	48	..	61	215	..
56	Bowman Gray School of Medicine of Wake Forest College	..	..	145	36	..	75	15	75	10
57	University of North Dakota School of Medicine	..	..	105	12	44	11	..	..	..
58	University of Cincinnati College of Medicine	..	..	165[3]	..	..	..	52	173	35
59	Western Reserve University School of Medicine	189	..	255	12	..	..	67	290	158
60	Ohio State University College of Medicine	378	51	369	154	217	1,164	24	202	85
61	University of Oklahoma School of Medicine	..	..	95	25	..	..	20	122	1,634
62	University of Oregon Medical School	..	..	276	22	..	13	28	84	388
63	Hahnemann Medical College and Hospital of Philadelphia	..	..	39	23	..	22	18	65	..
64	Jefferson Medical College of Philadelphia	..	..	252	18	23	..	33	100	102
65	Temple University School of Medicine	..	..	285	30	..	..	..	116	12
66	University of Pennsylvania School of Medicine	260	..	30	74	66	49	50	268	250
67	Woman's Medical College of Pennsylvania	..	..	76	..	..	..	12	25	10
68	University of Pittsburgh School of Medicine	9	..	107	..	..	..	12	255	178
69	University of Puerto Rico School of Medicine	55	..	..	19	..	..	24	70	..
70	Medical College of South Carolina	..	100	182	13	..	9	28	57	250
71	State University of South Dakota School of Medicine	..	..	17	1	100	..	3	4	..
72	University of Tennessee College of Medicine	395	195	112	86	..	53	48	97	..
73	Meharry Medical College	107	..	89	29	..	..	12	24	..
74	Vanderbilt University School of Medicine	..	..	..	..	..	..	32	79	..
75	University of Texas Southwestern Medical School	..	..	..	..	..	..	75	231	747[2]
76	University of Texas Medical Branch	..	..	160	42	..	..	39	153	266
77	Baylor University College of Medicine	..	..	60	..	..	57	32	201	20
78	University of Utah School of Medicine	..	31	95	39	52	300	30	69	53
79	University of Vermont College of Medicine	..	..	48	27	..	16	13	40	1
80	University of Virginia School of Medicine	..	..	220	..	..	..	34	103	129
81	Medical College of Virginia	294	213	288	79	..	14	51	121	..
82	University of Washington School of Medicine	300	150	719	226	624	781	42	112	1,119
83	West Virginia University School of Medicine	33	47	..	9	..	5	..	..	..
84	University of Wisconsin Medical School	..	65	182	172	41	24	14	115	775
85	Marquette University School of Medicine	329	..	..	212	..	..	18	159	72
	Totals	5,926	2,100	11,145	3,514	2,880	4,650	3,419	11,998	39,817
	Medical Schools in Canada									
1	University of Alberta Faculty of Medicine	90	100	45	17	200	100	25	49	4
2	University of British Columbia School of Medicine	..	42	160	35	50	34	33	70	39
3	University of Manitoba Faculty of Medicine	20	..	250	..	..	..	45	23	23
4	Dalhousie University Faculty of Medicine	26	24	20	..	..	13	52	54	3,393
5	Queen's University Faculty of Medicine	..	..	24	13	6	..	32	14	7
6	University of Ottawa Faculty of Medicine	..	..	17	..	..	..	26	17	4
7	University of Western Ontario Faculty of Medicine	..	..	127	..	..	..	..	..	..
8	University of Toronto Faculty of Medicine	167	165	34	383	49	..	121	..	155
9	McGill University Faculty of Medicine	150	..	100	..	275	120	75	311	190
10	University of Montreal Faculty of Medicine	90	107	..	108	..	94	102	..	26
11	Laval University Faculty of Medicine	..	..	325	39	..	..	141	69	12
12	University of Saskatchewan College of Medicine	..	87	152	33	4	41	12	46	1
	Totals	543	525	1,363	628	584	402	664	653	3,854

4. Duplicating figure of approximately 100 between these categories.
5. 76 graduate students (nonmedical), 44 in School of Public Health.
6. 583 are physicians attending short postgraduate courses given at school and out in the state.

instance, 100 registrants in a postgraduate course for physicians may require only relatively little time by a few faculty members in a year. A class of 100 student nurses may involve only a few of the medical faculty for a small number of lecture hours a year. This may be similarly the case with pharmacy students, arts and science majors, and technical students. On the other hand, a class of dental students may involve the basic medical science faculty to the same extent in time and energy as does a class of medical students. Interns and particularly residents exact a large expenditure of time and energy by the faculty members who are in those clinical services of the major teaching hospital(s).

Just as true cost accounting is helpful in presenting a meaningful picture of expenditures that can be of material assistance in securing understanding and support of budgetary needs, so would a similar approach in the apportionment of effort among the various teaching responsibilities be of assistance to the medical schools and to those who need to understand them. It is hoped that in the next year, a way will be developed for securing this kind of information, possibly in relation to the 1960-1961 year.

It should also be pointed out that, except for interns and residents, the numbers given for students other than medical students probably are larger than the number of people involved because of duplication. This is known to be true in postgraduate courses, in which the numbers represent enrollments and not the actual number of physician-registrants in nearly all cases. It is likely to be true with arts and science students, in which one student may register in more than one course in which the medical faculty participates, as well as with technical students. A student nurse in a degree program may be counted once as a nurse and again as an arts and sciences student. It is likely, therefore, that the total of 85,459 does not represent that number of individuals for whom medical faculties have had some teaching responsibilities in 1958-1959. This reservation as to the import of the numbers should be borne in mind in relation to the text that follows.

Of the total of 85,459 reported as other than medical students, 13% are students in nursing, 18% interns and residents and 47% are physicians in continuation education courses.

The 11,145 students in nursing involved the faculties of 65 medical schools. Sixty-four schools reported physicians in postgraduate courses, 61 schools reported 3,514 technical students, 34 schools reported 5,926 dental students and 4,650 "other" students, the faculties of 25 schools had 2,890 arts and sciences students, and 19 schools had pharmacy students for which the medical faculties had some teaching responsibility. All of the four-year medical schools except two (Temple and Missouri) reported interns, and the faculty personnel of all of the four year schools had teaching responsibilities for residents.

Six of the 81 four-year medical schools reported no students in the categories of dental, pharmacy, technical, nursing, arts and sciences majors, and other.

Counting all schools, including even those reporting only one physician in postgraduate courses, 64 schools were active in this field in 1958-1959, with a total of 39,817 enrollments. For all 64 schools, the average enrollment was 622 and the median was 160. The following tabulation presents this kind of information more adequately.

Number of Enrollments by Physicians	*Number of Schools*
1 - 20	17
21 - 100	8
101 - 500	21
501 - 1,000	7
1001 - 2,000	5
over - 2,000	6
	64

For the 47 medical schools having more than 20 enrollments of physicians in postgraduate courses in 1958-1959, the average enrollment for the year was 844 and the median was 294.

Table 5 also portrays the medical faculty teaching responsibilities for other than medical students for the Canadian schools. The schools reporting on this item had a total of 9,116 students, although the same reservations regarding duplication of individuals are probably as applicable to the Canadian schools as to those in the United States. This would also be the case in regard to the faculty time and energy requirement by other than medical students, with again the exception of dental students, interns and residents.

Students in nursing, physicians in continuation courses, and interns and residents accounted for 71% of all the students in addition to medical students, as compared to 78% in schools in the United States. The major difference was in the proportion of interns and residents reported in the two countries, with Canadian schools reporting 4% fewer in this category. Pharmacy students comprised a larger proportion of the additional students burdening medical faculties in Canadian schools, composing 5.7% of the total as compared to 2.5% in the United States. Technical students also loomed larger relatively in the teaching responsibilities of Canadian medical faculties, comprising 7% of additional students, which is almost twice the proportion they occupied in the United States.

Only one of the Canadian schools had no teaching responsibilities for other than medical students and nursing students. Six of the schools reported dental students, six schools reported pharmacy students, 11 schools reported student nurses, 7 of the

12 schools reported technical students, six reported arts and sciences majors, six reported students not otherwise categorized, 11 had interns among the teaching responsibilities of their medical faculties, and nine had residents. It is interesting that 11 schools reported physicians in continuation education courses with only five of the schools each having fewer than 20 enrollments.

GRADUATE EDUCATION IN THE BASIC MEDICAL SCIENCES

In addition to data secured in the previous three years regarding enrollments and degrees granted in the basic medical sciences, this year information was obtained from medical schools in the United States and Canada about the number of positions that were available in advanced degree programs. Table 6 presents the data by school, field, and program for the 1958-1959 year. The increasing number of unfilled budgeted faculty positions in the current 85 medical schools in the United States and 12 in Canada, as well as the prospect of additional schools lends greater importance to medicine each year of programs that provide the advanced education required for the production of additional teachers and investigators qualified to fill academic posts.

It is encouraging that the total enrollments in doctorate degree programs were 12% greater in 1958-1959 than in 1957-1958 in medical schools in the United States, and that enrollments in postdoctorate programs had increased 64% (table 6). Enrollments in masters degree programs were about the same as in preceding years. However, the total number of degrees granted in the various fields was fractionally lower, with 5% fewer masters degrees and 8.5% fewer doctorate degrees (Ph.D., Sc.D.) being awarded in 1958-1959 than in the previous year.

When the total positions available in graduate programs in the basic medical sciences were compared with total enrollments, it became evident that programs are generally available for additional students if they can be attracted into such preparation. There were about 30% more total positions available in masters and doctorate programs than there were students enrolled in 1958-1959, while there were 74% more postdoctorate positions available than were enrolled. There were greater surpluses of positions available as compared to students enrolled in doctorate programs in anatomy, biophysics, microbiology, and physiology than in other fields, the positions being in excess of students by 57%, 66%, 35% and 48%, respectively. There were more than three times as many postdoctorate positions in anatomy than there were students, while biophysics and microbiology postdoctorate programs each could have accommodated more than twice as many fellows as were present.

As table 6 demonstrates, the increased enrollments in masters degree programs in three fields (microbiology, pathology, and physiology) were almost offset by decreased enrollments for the masters degree in the other four fields so that little over-all change occurred in the total masters degree candidates. In doctorate programs, there were increased numbers of students in all of the basic medical sciences excepting biophysics (down 33%) and physiology (down 10%). The postdoctorate programs, on which data is probably incomplete, had generally increased enrollments in 1958-1959 except for biophysics, which had fewer than one-half of the postdoctorate enrollments reported in 1957-1958. Where increases occurred, they were usually substantial. The ranges of proportional amount of increase was 12% to 125% for doctorate programs and 46% to 200% for postdoctorate programs.

The one field in which the number of degrees granted was materially fewer in 1958-1959 than in the previous year was microbiology, in which there were awarded almost one-third fewer masters degrees and about one-fourth fewer doctorate degrees.

The 12 Canadian medical schools also showed increases in enrollments in advanced degree educational programs in the basic medical sciences. Total enrollments in programs leading to a masters degree were 46% greater in 1958-1959 than in 1957-1958. Doctorate program enrollments had an increased total enrollment by 10%. The number of postdoctorate fellows reported by Canadian medical schools in either year was too small to analyze.

In masters degree programs in the Canadian schools in 1958-1959, there were increased enrollments in anatomy, pharmacology, and physiology, with decreased enrollments as compared to the previous year in microbiology. The numbers were too small to justify proportional comparison. In doctorate programs, there were increased enrollments in biochemistry and pharmacology, with a decreased enrollment in pathology. As in the case of the United States schools, though there were increased enrollments in advanced degree programs in Canadian medical schools, there were generally a trifle fewer masters and doctorate degrees granted in the basic medical sciences.

The Canadian schools had more positions available for graduate study than there were students enrolled. The positions available in masters degree programs were 21% greater than the enrollments, while the positions available in doctorate programs were 12% greater than the number of students enrolled.

GRADUATE DEGREE PROGRAMS IN THE CLINICAL FIELDS

Table 7 presents the information reported for the 1958-1959 year by medical schools in the United States and Canada regarding masters degree and doctorate degree (other than M.D.) programs, en-

rollments, and degrees granted in clinical fields of work. A total of 34 medical schools in the United States (5 more than in 1956-1957) and 7 in Canada reported having masters and/or doctorate degree programs.

There were 32 schools in the United States in 1958-1959 with masters degree programs in clinical areas having a total enrollment of 1,240, while 13 schools reported having 168 enrolled in doctorate programs. Medicine and its subspecialties, preventive medicine and public health, surgery and surgical specialties accounted for more than four-fifths of enrollments. Not all of the educational programs leading to a masters degree or a doctorate in public health and preventive medicine are included in Table 7 because in a number of instances such programs are unrelated to the medical school, as at the University of Michigan and Harvard, for example.

A total of 22 schools in the United States granted 296 masters degrees, of which 149 or about one-half were in preventive medicine and public health. More than one-half of the 296 degrees were granted by 3 schools (Yale, Tulane, and Minnesota). Masters degrees were awarded in all of the major clinical fields except the combination of psychiatry and neurology.

Of the 24 doctorate degrees granted by 8 schools, 20 were granted by the University of Minnesota. Almost half of the 24 doctorate degrees were in surgery and surgical specialties. Other fields in which doctorates were granted were medicine, medical specialties, neurology, obstetrics and gynecology, and preventive medicine and public health.

Seven of the 12 Canadian medical schools reported having masters degree programs in clinical fields, with a total enrollment of 49, and 14 masters degrees granted in 1958-1959. One Canadian school, McGill, reported doctorate degree programs in clinical fields (experimental medicine and neurology), with an enrollment of 11 and the granting of 5 doctorate degrees in 1958-1959. Of the total of 19 masters and doctorate degrees in clinical fields granted, 18 were awarded by one school, McGill University.

Postgraduate Medical Education

Table 5 and the section entitled "Teaching Responsibilities of Medical School Faculties for Other Than Medical Students" presents information about the schools and physician enrollments in postgraduate continuation education programs in 1958-1959. No special study was conducted in the past year relative to enrollments and courses by all organizations and institutions active in that field because of the special study reported only two years ago and earlier in 1959.[10]

In 1958-1959 the 64 medical schools in the United States having programs of continuation education reported a total of 39,817 enrollments. The much larger size of this figure in relation to reports in previous years indicates that this may represent more complete data although it may also represent the larger role of medical schools in continuation education of physicians.

MEDICAL SCHOOL FACULTIES

Questions were included in the annual questionnaire to medical schools this year about numbers and status of total full-time faculty personnel regarding degrees held, academic rank, and numbers by department and rank of full-time faculty who received 50% or more of their salaried income from federal research and/or training grants exclusive of residents and fellows. The information published annually since 1949 regarding vacant faculty positions was also secured this year. In the following text and tables, the information received is presented, analyzed, and discussed.

FULL-TIME FACULTY DEGREES AND NUMBERS

Table 8 presents the status of 10,350 full-time faculty personnel by department and degree in the 85 medical schools in the United States. Pathology department faculty members are not included in either basic medical science or clinical department subtotals in this and succeeding tables unless otherwise stated because pathology departments have attributes of each group rather than predominantly of one or the other.

For the past 20 years at least there are no previous data on faculty degrees for all medical schools with which the 1958-1959 information can be compared.

For the total of 10,350 full-time faculty, 6,546 (or 63%) had the M.D. degree, 2,788 (or 27%) had the Ph.D. degree, and 466 (or 4.5%) had both degrees. As would be expected, the majority of M.D.'s (5,935 or 91%) were in clinical departments and pathology. If those with both the M.D. and Ph.D. are counted with the M.D. group, the proportion of M.D.'s remains the same, 91%, in the clinical departments and pathology.

A possibly unexpected finding was that 605 faculty members with the Ph.D. are in clinical departments, comprising 9% of clinical faculty personnel. If those with a Ph.D. in addition to the M.D. degree are included, then 12.6% of full-time clinical faculty people have the Ph.D. degree. This figure is identical with the proportion of Ph.D. faculty personnel in clinical departments reported in the NIH Study of Twenty Medical Schools. Approximately half of these are in the 2 departments of preventive medicine and psychiatry.

Although more than two-thirds (68%) of full-time faculty personnel in the basic medical science departments hold only the Ph.D. degree, another 7% have both degrees. Thus, from one point of view, three-fourths of full-time personnel in these depart-

TABLE 6.—*Advanced Degree and Postdoctoral Programs*

| | POSITIONS AVAILABLE | | |

and Enrollments in the Basic Medical Sciences

PROGRAMS and ENROLLMENT — DEGREES AWARDED, 1958-1959

	Masters									Doctorates									Postdoctorates									Masters									Doctorates								
	Anatomy	Biochemistry	Biophysics	Microbiology	Pathology	Pharmacology	Physiology	Other	Total	Anatomy	Biochemistry	Biophysics	Microbiology	Pathology	Pharmacology	Physiology	Other	Total	Anatomy	Biochemistry	Biophysics	Microbiology	Pathology	Pharmacology	Physiology	Other	Total	Anatomy	Biochemistry	Biophysics	Microbiology	Pathology	Pharmacology	Physiology	Other	Total	Anatomy	Biochemistry	Biophysics	Microbiology	Pathology	Pharmacology	Physiology	Other	Total
	1	2	..	1	1	..	1	..	6	3	6	..	..	..	..	1	2	12	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	1
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	1	1	..	2	2	4	2	..	12	..	1	..	..	..	2	..	..	3	..	..	2	..	2	..	..	..	..	4	..	2	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..
	..	1	..	..	..	..	..	..	1	..	2	..	1	..	1	..	..	4	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	2	..	..	..	1	..	..	..	..
	1	2	..	1	3	1	4	..	12	..	1	..	1	..	..	1	..	3	..	..	..	..	..	..	..	..	..	..	..	2	..	1	2	1	1	..	7	..	..	..	..	..	..	2	..
	1	1	..	2	..	..	..	..	4	1	1	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	1	4	..	..	..	2	2	2	11	..	3	3	1	..	..	1	1	9	..	..	..	..	..	..	..	..	..	..	1	2	..	..	..	..	..	..	3	3	1	..	..	..	..	..	4
	2	8	..	5	6	..	..	..	21	..	11	..	..	..	5	8	..	24	..	..	..	..	..	..	..	..	..	..	4	..	..	..	2	3	..	..	9	2	5	..	..	..	2	..	9
	7	7	..	3	..	1	6	7	31	3	31	..	6	1	4	6	3	54	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	..	3	..	7	..	3	..	3	1	14
	1	3	..	2	..	4	5	..	15	..	1	..	2	..	..	1	3	7	..	..	..	..	..	..	..	..	..	..	1	..	2	..	..	..	..	..	3	..	..	..	..	..	..	..	1
	..	3	..	..	..	1	..	..	4	..	8	..	..	..	..	..	..	8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	1	1	..	2	..	..	1	..	5	1	1	..	..	..	..	1	..	3	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	2	..	..	..	..	..	..	..	..
	17	36	..	11	7	15	32	15	133	5	62	3	11	1	14	17	8	121	..	1	..	2	..	2	..	..	..	5	2	16	..	4	3	4	6	..	35	2	16	1	5	..	1	7	1	33

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ments have the Ph.D. degree. On the other hand it might be said that more than one-fourth (27%) of the full-time basic medical science faculty earned the M.D. degree. Table 8 presents subtotals for the basic medical science departments before and after including pathology in order to stress the skewing and important group. Their importance in the basic medical sciences has increased concomitant with the great expansion of significant and highly complex knowledge in these fields, a body of knowledge and research techniques requiring full-time study to master to the point of advancing into new fron-

TABLE 7.—*Advanced Degree Programs*

	*Programs Available																	
	Masters									Doctorates								
	Medicine & Medical Specialties	Neurology	Obstetrics and Gynecology	Pediatrics	Psychiatry	Psychiatry and Neurology	Preventive Medicine & Public Health	Radiology	Surgery and Surgical Specialties	Medicine & Medical Specialties	Neurology	Obstetrics and Gynecology	Pediatrics	Psychiatry	Psychiatry and Neurology	Preventive Medicine & Public Health	Radiology	Surgery and Surgical Specialties
UNITED STATES																		
College of Medical Evangelists	√	..	..	..	..	..	√	..	√	..	..	..	..	..	..	..	..	..
University of California, Los Angeles	√	..	..	..	√	..	√	√	√	..	..	..	..	..	..	..	..	..
University of Colorado	√√	..	√	..	√	..	√	√	√	..	..	..	..	..	..	..	..	..
Yale University	..	..	√	√	..	..	√	√	√	..	..	..	..	..	..	√	..	√
University of Chicago	√	..	..	..	..	..	..	..	√	..	..	..	..	..	..	..	..	√
University of Illinois	√	..	..	..	..	..	..	..	√	..	..	..	..	..	..	..	..	√
State University of Iowa	√	..	..	..	..	..	√	√	√√	..	..	..	..	..	..	√	..	..
Tulane University	√	..	√	√	√	..	√	√	√√	..	..	..	..	..	..	√	..	..
Tufts University School of Medicine	√	..	..	..	..	..	..	..	√	..	..	..	..	..	..	..	..	√
University of Michigan	√	√	..	..	√	..	√	..	√	..	..	..	..	..	..	..	..	..
University of Minnesota	√√	√	√	√	√	..	√	√	√√	√√	√	√	√	√	..	√	√	√√
University of Mississippi	√	..	..	..	..	..	√	..	..	..	..	..	..	..	..	..	..	..
Creighton University	√	..	√	√	..	√	√	√	√	..	..	..	..	..	..	..	..	..
Columbia University	..	..	..	..	..	..	√	..	..	√	..	..	..	..	..	√	..	..
Cornell University	..	..	..	..	..	..	√	..	..	..	..	..	..	..	..	√	..	..
New York Medical College	√	..	√	√	..	..	..	√	√√	..	..	..	..	..	..	√	..	√
New York University	√	..	..	..	..	..	..	..	√√	..	..	..	..	..	..	..	..	√
State University of New York, New York City	..	..	..	..	√	..	..	..	..	..	..	..	..	..	..	..	..	..
University of Rochester	√	..	..	√	..	..	..	..	√	..	..	..	..	..	..	√	..	..
University of Cincinnati	√	..	..	..	..	..	√	..	..	..	..	..	..	..	..	..	..	..
Western Reserve University	..	..	..	√	..	..	..	..	√	..	..	..	..	..	..	√	..	..
Ohio State University	√	..	√	√	√	..	√	√	√	..	..	..	..	..	..	..	..	..
University of Oklahoma	√	..	√	..	..	..	..	..	√	..	..	..	..	..	..	..	..	..
Temple University	√	√	√	..	..	..	..	..	√√	..	..	..	..	..	..	..	..	..
University of Pennsylvania	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
University of Puerto Rico	..	..	..	..	..	..	√	..	..	..	..	..	..	..	..	..	..	..
University of Tennessee	..	..	√	√	..	..	..	..	√√	..	..	..	..	..	..	..	..	..
University of Texas Southwestern Medical School	..	..	..	..	..	..	..	√	..	..	..	..	..	..	..	..	..	..
University of Texas Medical Branch	..	..	..	..	..	..	√	..	..	..	..	..	..	..	..	√	..	..
Baylor University	√	..	..	..	√	..	..	..	..	..	..	..	..	..	..	..	..	..
University of Virginia	..	..	..	..	..	..	..	..	√	..	..	..	..	..	..	..	..	..
University of Washington	..	..	..	..	..	..	..	..	√	..	..	..	..	..	..	..	..	..
University of Wisconsin	√	..	..	..	..	..	..	..	√	..	..	..	..	..	..	..	..	..
Marquette University	√√	..	√	..	..	..	..	√	√√	..	..	..	..	..	..	..	..	..
Totals	*19	*3	*10	*8	*8	*1	*12	*10	*20	*2	*1	*1	*1	*1	*0	*9	*1	*5
CANADA																		
University of Alberta	..	..	√	√	√	..	..	..	√	..	..	..	..	..	..	..	..	..
University of Manitoba	√	..	..	√	√	..	..	..	√	..	..	..	..	..	..	..	..	..
University of Western Ontario	√	..	√	√	√	..	√	..	√	..	..	..	..	..	..	..	..	..
University of Toronto	..	..	..	..	√	..	..	..	√	..	..	..	..	..	..	..	..	..
McGill University	√	√	..	..	..	..	..	..	√	√	√	..	..	..	..	..	..	..
University of Montreal	..	..	..	..	..	..	..	..	√	..	..	..	..	..	..	..	..	..
Laval University	..	..	..	..	..	..	..	..	√	..	..	..	..	..	..	..	..	..
Totals	3	1	2	3	4	0	1	0	6	1	1	0	0	0	0	0	0	0

* Programs rather than position available are presented in this portion of the table; while the vertical totals represent the number of schools that reported degree programs in each field. Multiple checks in medicine and in surgery columns represent programs in sub-specialties in these fields.

effect that the preponderance of M.D.'s in pathology would have. The NIH Study of Twenty Medical Schools included pathology as a preclinical department, giving 34.9% M.D.'s and 60.3% Ph.D.'s in the preclinical departments.

It is obvious that in the basic medical science departments of medical schools, the 2,335 faculty personnel having the Ph.D. degree comprise a large tiers. The increasing inter-action of the basic medical science and clinical fields in the research study and understanding of disease processes probably is the most important factor accounting for the "pure" Ph.D. personnel in the clinical departments. Biochemistry, genetics, microbiology, pharmacology, and physiology—all with the aid of biophysics and biostatistics—are making increasingly important

contributions to advancing knowledge at the gross, cellular, subcellular, and molecular levels of the organism.

An analysis (table 9) was prepared of the distribution of degrees held by full professors and department chairmen as compared to the full-time

of medical schools, it is likely that an increasing proportion of the senior faculty in the future will be Ph.D. rather than M.D. personnel.

Table 10 presents for 11 of the 12 Canadian medical schools information about numbers of full time faculty by degree and department. For the reason

and Enrollment in the Clinical Sciences

Programs and Enrollments																		Degrees Awarded															
Masters									Doctorates									Masters									Doctorates							
Medicine & Medical Specialties	Neurology	Obstetrics and Gynecology	Pediatrics	Psychiatry	Psychiatry and Neurology	Preventive Medicine & Public Health	Radiology	Surgery and Surgical Specialties	Total	Medicine & Medical Specialties	Neurology	Obstetrics and Gynecology	Pediatrics	Psychiatry	Psychiatry and Neurology	Preventive Medicine & Public Health	Radiology	Surgery and Surgical Specialties	Total	Medicine & Medical Specialties	Neurology	Obstetrics and Gynecology	Pediatrics	Psychiatry	Psychiatry and Neurology	Preventive Medicine & Public Health	Radiology	Surgery and Surgical Specialties	Total	Medicine & Medical Specialties	Neurology	Obstetrics and Gynecology	Pediatrics	Psychiatry	Psychiatry and Neurology	Preventive Medicine & Public Health	Radiology	Surgery and Surgical Specialties	Total
2	..	..	..	..	..	..	..	4	6	..	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	0
4	..	..	..	..	..	..	..	..	4	..	..	..	..	..	..	..	..	..	0	5	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	0
21	..	8	..	..	..	..	..	9	10	4	..	..	..	..	..	..	..	..	4	8	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	0
..	..	..	..	..	..	..	..	..	43	..	..	..	..	..	..	..	..	..	0	6	..	..	1	..	..	..	..	..	8	..	..	..	..	..	..	..	..	..	0
..	..	..	..	..	..	48	..	..	48	..	..	..	..	..	..	3	..	..	3	3	..	..	..	..	..	..	1	..	4	..	..	..	..	..	..	3	..	..	3
..	..	..	..	..	..	..	..	3	3	..	..	..	..	..	..	..	..	3	3	40	..	..	..	..	..	..	..	..	40	..	..	..	..	..	..	3	..	..	3
1	..	..	..	..	..	..	..	2	3	..	..	..	..	..	..	..	..	..	0	3	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	3	..	36	39	..	..	..	..	..	..	4	..	..	4	2	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	0
..	..	..	..	..	..	57	..	..	57	..	..	..	..	..	..	15	..	..	15	4	..	..	..	..	..	..	1	..	3	..	..	..	..	..	..	..	..	..	0
1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	0	15	..	..	..	..	..	..	51	..	..	51	..	..	..	..	..	..	..	..	0
2	6	..	..	3	..	..	..	14	25	..	..	..	..	..	..	..	..	..	0	0	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0
256	22	23	21	31	..	4	51	343	751	24	6	1	5	2	..	1	3	55	97	2	3	..	..	..	..	..	7	15	..	..	..	..	..	..	..	..	..	0
29	2	1	..	..	..	1	..	7	62	2	..	2	1	..	..	..	..	5	10	0	2	..	..	..	..	..	2	4	..	..	..	..	..	..	..	..	..	0
2	..	..	..	..	..	..	..	2	4	..	..	..	..	..	..	..	..	..	0	2	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0
8	..	5	1	..	..	..	2	9	25	..	..	..	..	..	..	3	..	..	3	0	..	..	3	..	..	..	..	1	3	..	..	..	..	..	..	..	..	..	0
..	..	..	..	..	..	47	..	..	47	2	..	..	..	..	..	..	..	..	2	7	..	..	..	..	..	..	42	..	42	2	..	..	..	..	2	..	..	..	4
..	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	1	..	..	1	1	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0
..	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0	0	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0
2	..	..	..	..	..	..	..	48	50	..	..	..	..	..	..	..	..	1	1	1	..	..	..	..	..	..	..	5	5	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	..	0	..	..	..	..	3	..	..	..	..	3	3	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0
3	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..	0	3	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..	0
..	..	..	..	..	..	7	..	..	7	1	..	..	..	..	..	18	..	4	23	..	..	..	..	..	..	..	3	..	3	..	..	..	..	..	1	..	2	3
..	..	2	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	0	0	..	..	..	2	..	..	..	..	2	..	..	..	..	..	..	..	..	..	0
12	..	12	..	28	..	10	1	36	99	..	..	..	..	..	..	..	..	..	0	3	..	3	..	2	..	..	1	9	19	..	..	..	..	..	..	..	..	..	0
..	..	..	..	..	..	3	..	..	3	..	..	..	..	..	..	3	..	..	3	..	..	..	..	..	..	..	..	..	0	..	..	..	..	1	..	..	..	..	1
..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	0	5	..	1	..	..	..	..	..	6	12	..	..	..	..	..	..	1	..	..	1
..	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	0
..	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0	0	..	..	..	..	..	..	10	..	10	..	..	..	..	..	..	..	..	..	0
..	..	2	1	..	..	..	..	6	9	..	..	..	..	..	..	..	..	..	0	0	..	..	..	1	..	..	..	2	3	..	..	..	..	..	..	..	..	..	0
..	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	2	..	..	2	2	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0
..	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	1	..	..	1	1	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0
..	..	..	..	3	..	..	..	..	3	..	..	..	..	..	..	..	..	..	0	0	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0
..	..	..	..	..	..	..	..	2	2	..	..	..	..	..	..	..	..	..	0	0	..	..	..	..	..	..	..	2	2	..	..	..	..	..	..	..	..	..	0
..	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0	0	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0
..	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0	0	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0
..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	0	0	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0
314	29	50	25	70	0	180	59	513	1,240	31	6	1	5	5	0	52	5	63	168	52	6	8	3	5	0	149	5	68	286	4	2	1	0	0	0	7	0	10	24
4	..	..	1	4	..	..	..	1	10	..	..	..	..	..	..	..	..	..	0	0	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0
..	..	1	..	..	..	1	..	..	2	..	..	..	..	..	..	..	..	..	0	0	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	0
..	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0	0	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0
15	6	..	..	1	..	..	..	8	30	9	2	..	..	..	..	..	..	..	11	6	2	..	..	..	..	..	..	5	13	3	2	..	..	..	..	..	..	..	5
..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	0	0	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0
..	..	..	..	..	..	..	..	5	5	..	..	..	..	..	..	..	..	..	0	0	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	..	0
19	6	1	1	5	0	1	0	16	49	9	2	0	0	0	0	0	0	0	11	6	2	0	0	0	0	1	0	5	14	3	2	0	0	0	0	0	0	0	5

basic medical science faculty as a whole, excluding pathology. Whereas 407 or 50% of the 814 department heads and full professors had the M.D. degree, whether or not they also held the Ph.D. degree, about 27% of the total full-time basic medical science faculty had the M.D. degree. With the large reservoir of Ph.D. faculty (2,111) who have come into the basic medical science departments previously outlined for United States schools, pathology is listed after rather than with the basic medical science departments.

For the 586 full-time faculty as a whole in all departments, 358 or 61% had the M.D. degree, 138 or almost 24% had the Ph.D. degree, and 63 or 11% had both degrees.

As in the case of United States medical schools, about one-eighth of the full-time clinical faculty had the Ph.D. degree. However, in Canadian schools a larger proportion of basic medical science faculty personnel had the M.D. degree (52.5%) than in United States schools (27%).

TABLE 8.—*Full-Time Faculty Personnel by Fields and Degrees Held in Medical Schools in the United States*

	M.D.		Ph.D.		Both		Other		Total	
Field	No.	%	No.	%	No.	%	No.	%	No.	%
Anatomy	155	22.0	475	67.3	44	6.2	32	4.5	706	100.0
Biochemistry	46	6.7	582	85.0	35	5.1	22	3.2	685	100.0
Biophysics	12	12.9	66	71.0	3	3.2	12	12.9	93	100.0
Biostatistics	1	...	2	...	1	...	0	...	4	...
Genetics	3	...	4	...	1	...	0	...	8	...
Microbiology	113	20.5	374	67.8	28	5.0	37	6.7	552	100.0
Pharmacology	138	31.8	230	53.0	51	11.7	15	3.5	434	100.0
Physiology	135	23.8	351	61.9	58	10.2	23	4.1	567	100.0
Physiology-pharmacology	8	...	27	...	3	...	1	...	39	...
Subtotal	611	19.8	2,111	68.4	224	7.2	142	4.6	3,088	100.0
Pathology	626	82.6	72	9.5	27	3.6	33	4.3	758	100.0
Subtotal	1,237	32.2	2,183	56.8	250	6.5	175	4.5	3,845	100.0
Medicine	1,497	89.6	80	4.8	57	3.4	37	...	1,671	...
Obstetrics-gynecology	294	90.5	18	5.5	10	3.1	3	...	325	...
Pediatrics	618	88.3	27	3.8	24	3.4	31	...	700	...
Psychiatry	520	64.0	207	25.5	11	1.4	74	...	812	...
Pub. Health-Prev. Med.	192	49.6	85	22.0	19	4.9	91	23.5	387	100.0
Radiology	370	82.8	36	8.1	10	2.2	31	6.9	447	100.0
Surgery	790	90.5	29	3.3	43	4.9	11	1.3	873	100.0
Other clinical	1,028	79.8	123	9.5	41	3.2	97	7.5	1,289	100.0
Subtotal, all clinical	5,309	81.6	605	9.3	215	3.3	375	5.8	6,504	100.0
Over-all totals	6,546	63.3	2,788	26.9	466	4.5	550	5.3	10,350	100.0

The difference in degrees of faculty personnel between Canadian and United States medical schools was marked in pathology departments, also. In the 11 Canadian schools which supplied data, about one-half the full-time pathology faculty personnel had the M.D. degree and about one-half had the Ph.D. degree, while one-eighth had both degrees. For United States schools, 83% of the full-time pathology faculty personnel held the M.D. degree and 13% held the Ph.D. Thus, in the matter of degrees held, Canadian pathology departments resembled more their basic medical science departments, and United States pathology departments resembled more their clinical departments.

In Canadian schools, 76 (or 55%) of the 137 people having Ph.D. degrees but not the M.D. degree were in departments of biochemistry and physiology. These departments in United States schools had only 33% of the "pure" Ph.D. personnel.

In both countries, more than one-fourth of all full-time clinical faculty were in the departments of medicine. In Canada (table 11) the clinical department having the second largest number and proportion of full-time faculty was psychiatry (48 people or 21.5% of all clinical faculty). In the United States, surgery departments were in second place among clinical departments in the use of full-time faculty personnel, having 873 or 13.4% of all full-time clinical faculty.

FEDERAL GRANT SUPPORT OF FULL-TIME FACULTY PERSONNEL

In the special study of medical school faculties this year, a question was included relative to the number of full-time faculty members by academic rank and department who receive 50% or more of their salaried income from Federal research and/or training grants, excluding anyone in resident or fellowship status regardless of faculty title. Table 12 presents the information supplied by the 85 medical schools in the United States, while table 13 provides the information for the 11 Canadian schools which reported data.

A total of 1,392 of the 10,350 full-time faculty, or 13%, in United States medical schools received 50% or more of their salaried income from Federal grants. There was relatively little difference between basic medical science and clinical departments, being 13.3% for the former and 14% for the latter. Pathology had a smaller proportion of its full-time faculty members, only 9.5%, supported to this degree by Federal grants.

TABLE 9.—*Full-Time Faculty by Numbers and Proportions in Departments in Medical Schools in the United States*

Department	Number Persons		% of Total in Basic Sciences		% of Total in Clinical Fields	% Over-all, Total
Anatomy	706		22.9			
Biochemistry	685		22.2			
Biophysics	93		3.0			
Biostatistics	4		*			
Genetics	8		*			
Microbiology	552		17.9			
Pharmacology	434		14.1			
Physiology	567	1,040	18.4	33.7		
Pharmacology-physiology	39		1.2			
Total basic sciences	3,088					29.8
Pathology	758		19.7		10.4	7.3
Anesthesiology	302				4.6	
Medicine	1,671				25.7	
Obstetrics-gynecology	325				5.0	
Pediatrics	700				10.8	
Psychiatry	812				12.5	
Public health-preventive med.	387				5.9	
Radiology	447				6.9	
Surgery	873				13.4	
Other clinical†	987				15.2	
Total clinical	6,504				100.0	62.8
Over-all total	10,350					100.0

* Less than 1%.
† Includes dermatology, neurology, ophthalmology, orthopedic surgery, otolaryngology, physical medicine, urology, clinical science, industrial medicine, and rehabilitation.

Biophysics had by far the highest proportion of full-time faculty in this category, 59 or 63% of the faculties in biophysics having 50% or more of their salaries supplied by Federal grants. The next largest categories, having 20.8% so supported, were neurology and/or psychiatry if these be grouped together. Such a grouping was necessary as in the case of physiology-pharmacology in which some

schools have combined departments. For psychiatry alone, among schools having a separate department of psychiatry, 30% of the full-time faculty personnel were in this category relative to federal grant support. Physical medicine was in third place, having 25% of its full-time faculty receiving 50% or more of salaried income from Federal grants. Biochemistry had in the basic medical sciences the largest proportion of departmental faculty in this category (16%), about the same as in departments of medicine.

TABLE 10.—*Full-Time Faculty Personnel by Fields and Degrees Held in Medical Schools in Canada*

Field	M.D. No.	M.D. %	Ph.D. No.	Ph.D. %	Both No.	Both %	Other No.	Other %	Total No.	Total %
Anatomy	48	63.1	13	17.1	11	14.5	4	5.3	76	100.0
Biochemistry	7	10.3	50	73.5	7	10.3	4	5.9	68	100.0
Biophysics	1	10.0	7	70.0	1	10.0	1	10.0	10	...
Medical research	1	...	0	...	5	...	0	...	6	...
Microbiology	25	56.8	14	31.8	2	...	3	...	44	...
Pharmacology	12	40.0	12	40.0	5	...	1	...	30	...
Physiology	23	38.3	26	43.3	9	15.0	2	...	60	...
Pharmacology-physiology	0	...	5	...	0	...	0	...	5	...
Subtotal, Basic sciences	117	39.1	127	42.5	40	13.4	15	5.0	299	100.0
Pathology	56	87.5	1	...	5	7.8	2	...	64	...
Subtotal	173	47.6	128	35.3	45	12.4	17	4.7	363	100.0
Medicine	52		5		6		2		65	
Obstetrics-gynecology	14		0		0		1		15	
Pediatrics	24		1		1		1		27	
Psychiatry	37		1		5		5		48	
Surgery	24		0		4		0		28	
Other clinical	34		3		2		1		40	
Subtotal, clinical	185	83.0	10	4.5	18	8.0	10	4.5	223	100.0
Over-all total	358	61.1	138	23.5	63	10.8	27	4.6	586	100.0

It is apparent that, with more than one in every eight full-time faculty members receiving 50% or more of salaried income from federal grants, these grants are important sources of support for medical education and research.

The pattern was somewhat different in 11 Canadian medical schools, where a total of only 17 full-time faculty members, or 3% of the total full-time faculty personnel receive 50% or more of their salaried income from Federal research and/or training grants. Only one of these was in a clinical department, 14 were in basic medical science departments, and 2 in pathology departments (table 13). Nearly one-half of such faculty in Canada were in biochemistry departments.

FULL-TIME FACULTY POSITIONS UNFILLED, 1958-1959

In table 14 is presented information supplied by medical schools in the United States about budgeted but vacant full-time faculty positions in 1958-1959. Almost two-thirds (62%) of the total of 655 vacant positions were in clinical departments. The full-time faculty total vacant positions represented 6% of the 11,005 budgeted full-time faculty positions, both filled and unfilled. There was an increase again in 1958-1959 of total unfilled full-time faculty positions, as there has been each year for the past five years. Table 15 portrays comparative total data for the years 1954-1955 to and including 1958-1959.

In both basic science and clinical departments, approximately one-third of the faculty vacancies were newly budgeted positions, as was the case in the 1957-1958 year. More than two-thirds (68%) of all newly budgeted faculty positions in the basic medical sciences, excluding pathology, were in departments of anatomy, microbiology and pharmacology.

As compared to the 1957-1958 data, there were a total of 10 more vacant positions in the basic medical sciences, with anatomy (up 10), pharmacology (up 3), and pathology (up 2) showing the increases while the other departments had relatively fewer budgeted unfilled positions. The clinical departments had a greater increase in budgeted vacant faculty positions as compared with 1957-1958.

The increase each year in medical school unfilled full-time faculty positions should cause concern. As was pointed out a year ago, the vacancies existing in faculty posts reflect the numbers of faculty personnel required to maintain medical education at its present qualitative level and to produce the present number of graduates. It is certain that expansion of educational programs in medicine to meet the physician needs of an enlarging population will require additional full-time faculty.

The information from table 6 about advanced-degree programs in the basic medical sciences provides little reason for complacency when the

TABLE 11.—*Full-Time Faculty by Numbers and Proportions in Departments in Medical Schools in Canada*

Department	Number Persons	% Total in Basic Sciences	% Total in Clinical Fields	% Over-all, Total
Anatomy	76	25.4		
Biochemistry	68	22.7		
Biophysics	10	3.3		
Medical research	6	2.0		
Microbiology	44	14.7		
Pharmacology	30	10.0		
Physiology	60	20.1		
Pharmacology-physiology	5	1.7		
Total basic sciences	299			51.0
Pathology	64			10.9
Medicine	65		29.1	
Neurology	10		4.5	
Obstetrics-gynecology	15		6.7	
Pediatrics	27		12.1	
Psychiatry	48		21.5	
Public health-prev. medicine	13		5.8	
Surgery	28		12.5	
Other clinical*	17		7.6	
Total clinical	223			38.1
Over-all total	586			100.0

* Includes anesthesiology, dermatology, ophthalmology, orthopedic surgery, otolaryngology, physical medicine, radiology, urology.

figures are compared with the previous year. Although the number of students in doctorate (Ph.D. or Sc.D.) programs was 12% higher than in 1957-1958, the number of degrees awarded was 8% less. It is encouraging that the number of positions in basic medical sciences. There does not appear to be any departmental concentration of vacant posts either in the clinical fields or in the basic medical sciences.

TABLE 12.—*Number of Full-Time Faculty in United States by Department and Rank who Receive 50% or More of Their Salaried Income from Federal Research and/or Training Grants**

Department	Professor	Associate Professor	Assistant Professor	Instructor	Total	% Full-Time Faculty
Anatomy	3	9	11	17	40	5.6
Anatomy and microbiology	1	0	0	0	1	...
Biochemistry	3	14	48	46	111	16.2
Biophysics	9	18	17	15	59	63.4
Genetics	0	0	1	0	1	...
Microbiology	0	5	18	35	58	10.5
Microbiology and pathology	1	1	0	0	2	...
Neurological science	0	0	0	1	1	...
Pharmacology	5	9	26	25	65	13.4
Physiology	5	15	26	28	74	
Subtotal, basic medical sciences	27	71	147	167	412	13.3
Pathology	4	16	27	25	72	9.5
Subtotal	31	87	174	192	484	12.6
Anesthesiology	0	0	0	2	2	...
Dermatology	1	2	3	3	9	10.7
Industrial medicine	0	2	0	1	3	23.1
Internal medicine	7	40	117	119	283	20.3
Neurology	1	1	25	18	45	20.8
Neurology and psychiatry	0	1	2	6	9	
Obstetrics and gynecology	0	3	8	12	23	7.1
Ophthalmology	0	4	10	11	25	18.5
Orthopedics	0	0	0	2	2	...
Otolaryngology	0	0	3	6	9	...
Pediatrics	2	9	25	38	74	10.6
Physical medicine	1	3	5	27	36	24.8
Psychiatry	11	38	84	113	246	30.3
Public health and preventive medicine	4	3	21	20	48	12.4
Radiology	3	5	11	5	24	5.4
Rehabilitation	0	0	1	0	1	...
Surgery	2	15	21	27	65	7.4
Urology	0	1	1	2	4	...
Subtotal, clinical	32	127	337	412	908	14.0
Over-all totals	63	214	511	604	1,392	13.4

* Excluding anyone in resident or fellowship status, regardless of faculty title.

advanced degree programs was in such a surplus that many more able students could have been accommodated. Of the three basic medical sciences accounting for many of the newly budgeted faculty vacancies, pharmacology showed a significant increase (32%) in students in doctorate programs, and anatomy a more modest increase of 13% in the number of graduate candidates for a doctorate.

Table 16 presents for 11 Canadian medical schools, which supplied the data, information regarding unfilled full-time budgeted faculty positions. The total of 23 vacant posts is 3.8% of the total 609 filled and unfilled full-time faculty places. As in the case of United States schools, only one-third of the vacancies are in newly budgeted positions, although these represent a higher proportion of the clinical faculty vacancies than those in the

TOTAL NUMBERS AND OFFICE LOCATION OF ALL M.D. FACULTY

In order to better understand the meaning of the terms "full-time" and "part-time" and their significance in terms of the number of faculty personnel in medical schools in the United States, a part of the special faculty study included a question to all medical schools about the total number of M.D. faculty personnel by rank, location of office, and source of income. The total figures secured are presented in table 17. In each box determined by the intersections of rank and description of office location and income source are three numerals. The first represents the number of faculty so categorized in all basic medical science departments, including pathology, the second represents the number so categorized in all clinical departments, while the last number is the total of the first two. It should be emphasized that this section deals with all M.D. faculty, whether they are considered as full-time, part time or volunteer. The immediately preceding sections on faculty degrees, federal grant support, and vacant faculty posts were limited to full-time faculty personnel.

The total of M.D. faculty personnel in 1958-1959 was 31,190, of which 2,455 were in basic medical science departments and pathology, while 28,735 were in clinical departments. Thus, 92% of the total

TABLE 13.—*Number of Full-Time Faculty in Canada by Department and Rank who Receive 50% or More of Their Salaried Income from Federal Research and/or Training Grants**

Department	Professor	Associate Professor	Assistant Professor	Instructor	Total	% Full-Time Faculty
Anatomy	0	1	0	0	1	...
Biochemistry	0	2	4	1	7	41.2
Medical Research	1	2	0	0	3	...
Microbiology	0	1	1	0	2	...
Physiology	0	0	0	1	1	...
Subtotal, basic medical sciences	1	6	5	2	14	4.7
Pathology	0	1	1	0	2	...
Subtotal	1	7	6	2	16	4.4
Medicine	0	0	1	0	1	...
Subtotal, clinical	0	0	1	0	1	...
Over-all totals	1	7	7	2	17	2.9

* Excluding anyone in resident or fellowship status regardless of faculty title.

M.D. faculty held their major appointments in clinical departments. From 67% to 70% of the total M.D. faculty was volunteer unsalaried professional personnel.

At the other extreme, 3,540 or 11% were what is ordinarily called "absolute" full-time, with their only office in the university medical center and

income only from the medical school and/or its teaching hospital. About two-thirds (63%) of these were in clinical departments, and one-third in basic medical science departments including pathology. More than half (55%) of the "absolute" full-time M.D. faculty were in the more junior academic positions of instructor and assistant professor.

TABLE 14.—*Budgeted Unfilled Full-Time Faculty Positions in Medical Schools in the United States, 1958-1959*

	Newly Budgeted Positions, No.				Old Positions, No.					Old and New Positions, Total				
Basic Science Departments	Instructor	Assistant Professor	Associate Professor	Professor	Total	Instructor	Assistant Professor	Associate Professor	Professor	Total	Instructor	Assistant Professor	Associate Professor	Professor	Total
Anatomy	9	6	1	1	17	11	11	5	11	38	12	17	6	12	55
Biochemistry	3	4	0	0	7	4	2	5	2	13	7	6	5	2	20
Biophysics	1	0	0	0	1	2	0	4	2	8	3	0	4	2	9
Microbiology	5	3	2	3	13	10	11	4	2	27	15	14	6	5	40
Pathology	3	6	6	1	16	8	18	10	8	44	11	24	16	9	60
Pharmacology	2	7	2	2	13	11	9	2	0	22	13	16	4	2	35
Physiology	3	4	3	1	11	7	4	5	2	18	10	8	8	3	29
Other basic science dept.															
Genetics	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1
Subtotals	26	30	15	8	79	53	55	35	27	170	79	85	50	35	249
Clinical Departments															
Anesthesiology	5	1	2	1	9	5	12	2	2	21	10	13	4	3	30
Dermatology	1	2	0	0	3	0	0	0	0	0	1	2	0	0	3
Medicine	6	9	5	1	21	6	11	7	3	27	12	20	12	4	48
Neurology	3	3	0	0	6	3	3	0	0	6	6	6	0	0	12
Obstetrics-gynecology	11	4	3	2	20	7	13	2	5	27	18	17	5	7	47
Ophthalmology	0	0	1	1	2	2	3	2	2	9	2	3	3	3	11
Orthopedics	0	0	0	0	0	0	1	3	0	4	0	1	3	0	4
Otolaryngology	1	1	0	2	4	2	1	0	0	3	3	2	0	2	7
Pediatrics	3	9	5	3	20	2	7	10	4	23	5	16	15	7	43
Physical medicine	0	0	2	1	3	1	2	0	0	3	1	2	2	1	6
Psychiatry	8	8	4	4	24	11	15	8	3	37	19	23	12	7	61
Public Health-Preventive Medicine	3	2	3	2	10	4	9	6	5	24	7	11	9	7	34
Radiology	5	5	1	1	12	8	8	7	1	24	13	13	8	2	36
Surgery	5	7	3	2	17	8	10	10	3	31	13	17	13	5	48
Urology	1	1	0	1	3	4	2	3	0	9	5	3	3	1	12
Other clinical departments	1	0	0	0	1	0	3	0	0	3	1	3	0	0	4
Totals	53	52	29	21	155	63	100	60	28	251	116	152	89	49	406
Subtotals	79	82	44	29	234	116	155	95	55	421	195	237	139	84	655

What would ordinarily be known as "geographical full-time" faculty personnel were the physicians in categories (*b*) or (*b*) and (*c*). If (*d*) also were included, then such faculty personnel would number 3,348 physicians. This represented about one-tenth of the total M.D. faculty. Those in category (*c*), whose only office was in the university medical center and whose income was from salary and unrestricted private practice totalled only 1.7% of all M.D. faculty personnel and only 8% of the total full-time faculty in its broadest interpretation.

Ordinarily, categories (*d*) and (*e*) would be considered part-time faculty members and these totalled 3,027, of which 197 were in basic medical science departments, including pathology. Thus,

TABLE 15.—*Budgeted Unfilled Full-Time Faculty Positions in Medical Schools in the United States (1954-1955 to 1958-1959)*

	1954-1955	1955-1956	1956-1957	1957-1958	1958-1959
Anatomy	25	18	22	45	55
Biochemistry	9	8	17	28	20
Biophysics	..	..	..	..	9
Microbiology	14	15	18	41	40
Pathology	27	33	46	58	60
Pharmacology	16	19	17	32	35
Physiology	16	15	21	35	29
Genetics	..	..	..	..	1
Subtotals	107	108	141	239	249
Anesthesiology	5	10	6	24	30
Dermatology	..	..	..	..	3
Medicine	23	28	29	55	48
Neurology	..	..	..	..	12
Obstetrics & Gynecology	14	16	13	28	47
Ophthalmology	..	..	..	..	11
Orthopedics	..	..	..	..	4
Otolaryngology	..	..	..	..	7
Pediatrics	15	12	21	35	43
Physical Medicine	..	..	..	..	6
Psychiatry	30	21	29	55	61
Public health & preventive medicine	17	14	19	44	34
Radiology	11	8	..	30	36
Surgery	19	22	42	44	48
Urology	..	..	..	..	12
Other clinical departments	17	12	31	65	4
Subtotals	151	143	190	380	406
Totals	258	251	331	619	655

TABLE 16.—*Budgeted Unfilled Full-Time Faculty Positions in Medical Schools in Canada, 1958-1959*

	Newly Budgeted Positions, No.				Old Positions, No.					Old and New Positions, Total				
Basic Science Departments	Instructor	Assistant Professor	Associate Professor	Professor	Total	Instructor	Assistant Professor	Associate Professor	Professor	Total	Instructor	Assistant Professor	Associate Professor	Professor	Total
Anatomy	1	0	0	0	1	0	1	0	0	1	1	1	0	0	2
Biochemistry	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1
Microbiology	0	1	1	0	2	0	0	0	0	0	0	1	1	0	2
Pathology	0	1	0	0	1	0	2	0	1	3	0	3	0	1	4
Pharmacology	0	0	0	0	0	1	1	0	1	3	1	1	0	1	3
Physiology	0	0	0	0	0	1	0	1	0	2	1	0	1	0	2
Subtotals	1	2	1	0	4	2	5	1	2	10	3	7	2	2	14
Clinical Departments															
Medicine	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1
Obstetrics-gynecology	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1
Pediatrics	0	0	0	0	0	1	0	0	0	1	1	0	0	0	1
Physical Medicine	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1
Psychiatry	0	1	0	0	1	0	1	1	0	2	0	2	1	0	3
Public health—preventive medicine	0	0	1	0	1	0	0	0	1	1	0	0	1	1	2
Subtotals	0	3	1	0	4	1	2	1	1	5	1	5	2	1	9
Totals	1	5	2	0	8	3	7	2	3	15	4	12	4	3	23

the part-time faculty composed about 10% of all M.D. faculty or about one-third of all faculty excepting the volunteer unsalaried faculty members.

Table 18 presents comparative data in total M.D. faculty numbers in the clinical departments for 1953-1954 and 1958-1959. There has been surpris-

ingly little change in all categories and in totals. The greatest change has been an increase in what is ordinarily known as geographical full-time (categories *b* + *c*, clinical), which was up 22% in 1958-1959. Although these faculty members constitute a relatively small proportion of total faculty, they are important in the education and research programs of the schools, which could not readily find budgets for that number of "absolute" full-time faculty.

In regard to the arrangements between schools and faculty members having private practice privileges (categories *b*, *c*, and *d*), the schools were queried as to whether all, some, or none of the faculty members in each category paid the schools for use of the office and services. Table 19 presents the responses of 69 schools in the United States. The lines do not add horizontally to total 69 because some schools reported a certain number of faculty as paying "all," and other faculty members as paying "some" or "none," having interpreted these to mean proportion paid rather than proportion of faculty paying. Dual interpretation blurs somewhat the significance of the responses when combined, although trends are apparent. The 69 schools also did not complete all parts, thus accounting for totals less than 69.

A total M.D. faculty numbering 31,190 was reported for 1958-1959. A total of 185,317 M.D.'s in practice were listed in the current American Medical Directory. Consequently, about one in six (17%) of the practicing medical profession have some kind of faculty appointment in one or more of the 85 medical schools in the United States. This represents a significant segment of the medical profession who had a demonstrated and active interest in basic medical education and research.

TABLE 17.—*Faculty Office Location and Source of Income for ALL M.D. Faculty in Basic Medical Science and Clinical Departments in Medical Schools in the United States*

Description	M.D.'s Only										Subtotals and Totals	
	Department Head		Professor, not Dept. Head		Associate Professor		Assistant Professor		Instructor*			
(a) Only office in the university medical center, income only from medical school and/or teaching hospital	235†		191		287		339		251		1,303	
	241‡	476	229	420	378	665	662	1,001	727	978	2,237	3,540
(b) Only office in the university medical center, income from salary and officially restricted private practice	42		39		56		45		27		209	
	292	334	246	285	470	526	606	651	410	437	2,024	2,233
(c) Only office in the university medical center, income from salary and unrestricted private practice	2		6		4		1		3		16	
	64	66	94	100	130	134	133	134	101	104	522	538
(d) Only office in the university medical center, entire income from private practice	0		1		2		0		2		5	
	25	25	34	35	86	88	150	150	277	279	572	577
(e) Outside private office (with or without medical center office) income from medical school salary and private practice outside medical center	2		17		35		63		75		192	
	115	117	217	234	337	372	758	821	831	906	2,258	2,450
(f) Outside private office (with or without medical center office) entire income from private practice outside medical center	2		35		94		196		239		506	
	144	146	1,160	1,195	2,363	2,457	5,704	5,900	11,016	11,255	20,387	20,953
(g) Other	5		18		22		67		52		164	
	7	12	70	88	151	173	188	255	319	371	735	899
Totals of Faculty in all categories Basic Science Departments											2,455	
Clinical Departments											28,735	
Over-all												31,190

* Excluding anyone in resident or fellowship status, regardless of faculty title.
† In each instance, the first number represents the total in basic medical science departments.
‡ The second number in each case is the total number of persons in the category in the clinical departments.

TABLE 18.—*Comparison of Clinical Faculty Numbers*

Status*	United States		Canada	
	1953-1954†	1958-1959‡	1953-1954§	1958-1959‖
(1) Absolute full-time	2,153	2,237	25	76
(2) Geographical full-time	2,078	2,546	32	135
(3) Part-time	2,876	2,830	498	790
(4) Volunteer	21,328	21,122	620	367
	28,435	28,735	1,175	1,368

* Using categories that are generally meaningful and which were used in 1953-1954 report (J.A.M.A. 156:147 [Sept. 11] 1954). For 1958-1959 year, (1) from category **a**, table 17, (2) from **b** + **c**, (3) from **d** + **e**, (4) or volunteer fom **f** + **g**.
† 74 four-year schools and 6 two-year schools.
‡ 81 four-year schools and 4 two-year schools.
§ 11 four-year schools and 1 two-year school.
‖ 12 four-year schools.

TABLE 19.—*Number of Schools* in the United States in Which the Faculty Members Pay the Medical School for Use of the Office and Services in the Case of:*

In table 17, category as follows	Senior Faculty*†	Junior Faculty†
(b)	All, 10; some, 6; none, 64	All, 10; some, 5; none, 65
(c)	All, 5; some, 7; none, 46	All, 3; some, 8; none, 46
(d)	All, 3; some, 4; none, 40	All, 3; some, 2; none, 39

* Total number of schools responding to this was 69.
† Senior faculty—prof. and assoc. prof.; Junior faculty—asst. prof. and instructor.

Table 20 portrays for 11 of the 12 approved Canadian medical schools similar information about total M.D. faculty. There was a total of 1,584 physicians, with 1,368 or 86% of them in the clinical fields. A slightly larger proportion of total M.D. faculty held appointments in basic medical science departments of Canadian schools than was the case in the United States schools.

The prevailing pattern for the basic medical science departments, including pathology, appeared in Canada to be absolute full-time (category *a*), accounting for more than three-fourths (77%) of comparing clinical faculty numbers in 1958-1959 with numbers from a 1953-1954 study reveals the threefold to fourfold increase in full-time M.D. faculty in clinical departments in Canadian schools in the past five years. Concomitant with the increase in absolute and geographical full-time clinical faculty as well as a 59% increase in part-time salaried faculty, there has been a decrease in numbers in the volunteer unsalaried faculty category, a decrease of 41%. The total clinical faculty personnel have increased 193, or 16%, in number in five years in the Canadian schools, whereas there has been an in-

TABLE 20.—*Faculty Office Location and Source of Income for ALL M.D. Faculty in Basic Medical Science and Clinical Departments in 11 Medical Schools in Canada*

Description	M.D.'s Only										Subtotals and Totals
	Department Head		Professor, not Dept. Head		Associate Professor		Assistant Professor		Instructor*		
(a) Only office in the university medical center, income only from medical school and/or teaching hospital	50†		10		33		42		31		166
	14‡		2		12		16		32		76
		64		12		45		58		63	242
(b) Only office in the university medical center, income from salary and officially restricted private practice	0		0		0		0		0		0
	27		3		23		24		10		87
		27		3		23		24		10	87
(c) Only office in the university medical center, income from salary and unrestricted private practice	1		1		0		0		0		2
	7		0		4		34		3		48
		8		1		4		34		3	50
(d) Only office in the university medical center, entire income from private practice	0		0		0		0		0		0
	0		0		1		0		0		1
		0		0		1		0		0	1
(e) Outside private office (with or without medical center office) income from medical school salary and private practice outside medical center	0		1		6		12		11		30
	27		24		123		225		390		789
		27		25		129		237		401	819
(f) Outside private office (with or without medical center office) entire income from private practice outside medical center	0		0		0		0		0		0
	0		0		0		2		327		329
		0		0		0		2		327	0
											329
(g) Other	1		1		1		9		6		18
	1		0		5		13		19		38
		2		1		6		22		25	56
Totals of faculty in all categories:											
Basic medical science departments											216
Clinical departments											1,368
Over-all											1,584

* Exclude anyone in resident or fellowship status, regardless of faculty title.
† Number of faculty members in category in basic medical science departments.
‡ Number of faculty members in category in clinical departments.

M.D. faculty in those departments. The predominant category in the clinical fields was (*e*), in which the faculty member had his office and private practice outside the medical center, although he received some salary from the school or hospital. This accounted for 58% of the clinical M.D. faculty reported; with the addition of category (*f*), which constituted unsalaried volunteer faculty members, the proportion was increased to 82% of the total M.D. faculty personnel, similar to the 79% that categories (*e*) and (*f*) amount to of M.D. faculty in United States schools.

It seems evident from the data reported for United States and Canadian schools regarding faculty personnel that the full time pattern of staffing is present to a greater extent, particularly in clinical departments in United States schools as compared to the Canadian medical schools. However, table 18 crease of 300 or 10% in United States schools, according to comparison of the current study with that of five years ago.

MEDICAL STUDENTS

ENROLLMENTS

In 1958-1959 the number of students enrolled in the 85 medical schools in the United States was again larger than in previous years. The total first year class was 8,128, as compared with 8,030 in 1957-1958. Total enrollment of medical students was 29,614, which was 141 more than in the previous year. As can be noted in table 21, this is the largest total enrollment to date. Complete enrollment data for individual schools is shown in table 1.

Table 1, as well as other tables, includes information about students in the newly developing schools (Seton Hall College of Medicine and Dentistry and University of Florida College of Medicine) which are provisionally approved on the basis of full implementation of the first two years. Also, the figures in table 1 for enrollments by class as well as the total enrollments include the special and part-time students. The numbers of these students are tabulated for each school in the column after total enrollment, although they are distributed in the enrollment figures in the prior columns. A special study was reported last year of the categories of programs setting apart the part-time and special students. Such a study was not repeated in the current year.

TABLE 21.—*Schools, Students, and Graduates in the Medical and Basic Medical Science Schools in the United States, 1931-1959*

	Schools	1st Year	2nd Year	3rd Year	4th Year	Total	Graduates
1930-1931	76	6,456	5,538	5,080	4,908	21,982	4,735
1931-1932	76	6,360	5,462	4,982	4,885	22,135	4,936
1932-1933	77	6,426	5,479	5,017	4,948	22,466	4,895
1933-1934	77	6,457	5,571	4,988	4,937	22,799	5,035
1934-1935	77	6,356	5,642	5,142	4,966	22,888	5,101
1935-1936	77	6,605	5,458	5,230	5,020	22,564	5,183
1936-1937	77	5,910	5,269	5,140	5,158	22,095	5,377
1937-1938	77	5,791	5,225	4,986	5,036	21,587	5,194
1938-1939	77	5,764	5,160	4,947	4,921	21,302	5,089
1939-1940	77	5,794	5,177	4,921	4,894	21,271	5,097
1940-1941	77	5,837	5,254	4,969	4,849	21,379	5,275
1941-1942	77	6,218	5,406	5,087	4,942	22,031	5,163
1942-1943	76	6,425	5,828	5,278	5,100	22,631	5,223
1943-1944	77	6,561	6,071	5,640	5,257	23,529	5,134
1944 (2nd session)	77	6,648	6,140	6,084	5,794	24,666	5,169
1944-1945	77	6,523	5,979	5,700	5,826	24,028	5,136
1945-1946	77	6,060	5,750	5,751	5,655	23,216	5,826
1946-1947	77	6,564	5,575	5,767	5,994	23,900	6,389
1947-1948	77	6,487	5,758	5,154	5,340	22,739	5,543
1948-1949	78	6,688	6,194	5,702	5,086	23,670	5,094
1949-1950	79	7,042	6,344	6,079	5,688	25,103	5,553
1950-1951	79	7,177	6,690	6,263	6,056	26,186	6,135
1951-1952	79	7,436	6,864	6,577	6,195	27,076	6,080
1952-1953	79	7,425	7,063	6,725	6,475	27,688	6,668
1953-1954	80	7,449	7,068	6,983	6,727	28,227	6,861
1954-1955	81	7,576	7,104	6,957	6,946	28,583	6,977
1955-1956	82	7,686	7,174	6,893	6,886	28,639	6,845
1956-1957	85*	8,014	7,259	7,023	6,884	29,130	6,796
1957-1958	85*	8,030	7,504	7,051	6,888	29,473	6,861
1958-1959	85†	8,128	7,482	7,182	6,872	29,614	6,860

* Includes schools in development.
† Includes schools provisionally approved.

The median total enrollment of all 85 schools in 1958-1959 was 330, and the average total enrollment was 348. If the group of 79 schools having students in all four years is considered, the median total enrollment was 337 and the average total enrollment was 367. Although the average four years ago (1954-1955) was 375 students, the median then was 334+, not a significant change.

The same four schools, as was the case in the previous year, each had a total enrollment greater than 600 (Michigan, Illinois, Jefferson, and Tennessee). Two of them admitted more than 200 students to the 1958-1959 entering class (Illinois 201 and Tennessee 202). Three of the four largest schools admitted fewer students to the 1958-1959 entering class as compared to the previous year: Michigan 9 fewer, Jefferson 3 fewer, and Tennessee 18 fewer. However, the University of Illinois enrolled 11 more students in the 1958-1959 first-year class than was the case last year. In addition to the foregoing, there were three state schools having first year enrollments greater than 150 (Indiana, New York at Brooklyn, and Ohio). This is two fewer than in 1957-1958.

The total entering class (8,128) was the largest to date enrolled in approved medical schools in the United States, as table 21 portrays. There was not the sharp increase over the previous year such as occurred in 1956-1957, however, because unlike that year when the classes in three newly developing schools were included, no additional classes appear in the 1958-1959 figures. Entering class sizes increased in 35 schools, were unchanged in 24, and decreased in 26. A substantial increase occurred at Wayne State University College of Medicine. The addition of 50 students the size of the entering class increased by 67%. This increase was planned for during the past three years during which the faculty and budget had a comparable augmentation to make the larger class size possible. Three other schools had significant increases in first year enrollments: University of California, up 28%; University of California at Los Angeles, up 12%; and University of Wisconsin, up 12%. The only major decrease in entering enrollment was in the University of Tennessee medical school, with 18 fewer students, down 8%.

The median entering class numbered 86, the same as that in 1957-1958. The average first year class was 95.6, comparable to 94.5 the year previously.

Table 22, prepared by the Association of American Medical Colleges, lists by schools the number of applicants and applications to each of the schools for the 1958-1959 class. It should be noted that, even though the numbers of men and women listed as applying to each school are individual applicants to each school, the over-all totals of these columns enumerate applications, not applicants. A total of 59,102 applications were filed by 15,170 persons, or an average of 3.9 applications made by each prospective medical student. Inspection of table 22 reveals that the applicant to class place ratio varies tenfold among the schools, ranging from 1.7 to 17:1.

The number of applicants decreased by 621, about 4% less than a year ago. This coupled with the increased size of the first year class, the over-all applicant to class place ratio was thus 1.86:1, the first year in more than a decade that it has fallen below 1.92. Table 23 presents comparable figures for entering class, applicants, and ratio during the past 11 years. The post World War II unusual flood of applicants had disappeared by 1953-1954,

TABLE 22.—*Number of Applicants and Completed Applications by Medical School for Class First Entering 1958-1959**

	Size of Freshmen Class	No. of Applications			Total Applications Filed by Applicants to Each School	Av. No. of Applications per Applicant
		Men	Women	Total		
Medical College of Alabama	81	308	18	326	1,704	5.5
University of Arkansas School of Medicine	95	172	7	179	292	1.6
College of Medical Evangelists	114	175	16	191	532	2.8
University of California School of Medicine, Los Angeles	56	548	46	594	4,610	7.8
University of Southern California School of Medicine, Los Angeles	68	642	45	687	5,726	8.3
Stanford University School of Medicine	61	610	50	660	5,339	8.1
University of California School of Medicine, San Francisco	101	572	45	617	4,555	7.4
University of Colorado School of Medicine	86	207	10	217	667	3.1
Yale University School of Medicine	81	984	73	1,057	8,957	8.5
Georgetown University School of Medicine	112	1,107	58	1,165	10,216	8.8
George Washington University School of Medicine	101	1,209	62	1,271	11,485	9.0
Howard University College of Medicine	105	613	49	662	3,396	5.1
University of Miami School of Medicine	75	225	12	237	1,276	5.4
University of Florida College of Medicine	50	304	14	318	2,369	7.4
Emory University School of Medicine	74	665	28	693	4,679	6.8
Medical College of Georgia	102	250	12	262	631	2.4
Chicago Medical School	72	981	18	999	10,059	10.1
Northwestern University Medical School	132	1,314	69	1,383	10,391	7.5
Stritch School of Medicine of Loyola University	88	711	23	734	5,005	6.8
University of Chicago, The School of Medicine	73	938	52	990	8,628	8.7
University of Illinois College of Medicine	201	630	31	661	2,734	4.1
Indiana University School of Medicine	160	479	33	512	2,496	4.9
State University of Iowa College of Medicine	120	195	4	199	462	2.3
University of Kansas School of Medicine	98	286	20	306	1,750	5.7
University of Louisville School of Medicine	100	320	10	330	1,588	4.8
Louisiana State University School of Medicine	129	256	19	275	673	2.4
Tulane University School of Medicine	134	1,041	44	1,085	7,455	6.9
Johns Hopkins University School of Medicine	74	923	77	1,000	8,165	8.2
University of Maryland School of Medicine and College of Physicians and Surgeons	100	325	12	337	2,707	8.0
Boston University School of Medicine	74	1,102	81	1,183	11,495	9.7
Harvard Medical School	114	1,179	95	1,274	9,243	7.3
Tufts University School of Medicine	114	942	59	1,001	9,606	9.6
University of Michigan Medical School	197	561	42	603	2,465	4.1
Wayne State University College of Medicine	125	294	20	314	1,117	3.6
University of Minnesota Medical School	139	286	21	307	1,158	3.8
University of Mississippi School of Medicine	78	243	9	252	1,056	4.2
University of Missouri School of Medicine	76	196	11	207	652	3.1
Saint Louis University School of Medicine	126	1,109	39	1,148	8,864	7.7
Washington University School of Medicine	86	1,353	61	1,414	10,767	7.6
Creighton University School of Medicine	77	1,038	31	1,069	8,724	8.2
University of Nebraska College of Medicine	81	199	5	204	727	3.6
Dartmouth Medical School	34	321	3	324	3,013	9.3
Seton Hall College of Medicine and Dentistry	80	1,188	71	1,259	11,113	8.8
Albany Medical College of Union University	65	1,058	53	1,111	10,806	9.7
University of Buffalo School of Medicine	88	666	28	694	6,990	10.0
Albert Einstein College of Medicine of Yeshiva University	96	881	55	936	9,640	10.3
Columbia University College of Physicians and Surgeons	120	1,223	118	1,341	10,877	8.1
Cornell University Medical College	86	1,061	108	1,169	10,207	8.7
New York Medical College, Flower and Fifth Avenue Hospitals	127	1,579	100	1,679	15,360	9.1
New York University College of Medicine	132	1,248	124	1,372	13,398	9.8
State University of New York Downstate Medical Center, New York City	154	1,134	84	1,218	11,375	9.3
University of Rochester School of Medicine and Dentistry	69	1,035	49	1,084	10,642	9.8
State University of New York Upstate Medical Center, Syracuse	87	873	41	914	8,042	9.5
University of North Carolina School of Medicine	70	318	14	327	1,788	5.5
Duke University School of Medicine	79	888	32	920	7,654	8.3
Bowman Gray School of Medicine of Wake Forest College	55	821	39	860	6,879	8.0
University of North Dakota School of Medicine	41	80	2	82	322	3.9
University of Cincinnati College of Medicine	92	963	34	997	8,031	8.1
Western Reserve University School of Medicine	78	1,272	81	1,353	10,725	7.9
Ohio State University College of Medicine	151	499	26	525	2,341	4.5
University of Oklahoma School of Medicine	100	238	12	250	1,147	4.6
University of Oregon Medical School	80	435	24	459	3,144	6.8
Hahnemann Medical College and Hospital of Philadelphia	109	323	17	340	2,325	6.8
Jefferson Medical College of Philadelphia	175	1,599	...	1,599	11,206	7.0
Temple University School of Medicine	136	1,182	62	1,244	9,960	8.0
University of Pennsylvania School of Medicine	126	1,576	93	1,669	13,416	8.0
Woman's Medical College of Pennsylvania	51	...	207	207	1,202	5.8
University of Pittsburgh School of Medicine	101	626	44	670	5,125	7.6
University of Puerto Rico School of Medicine	55	105	18	123	385	3.1
Medical College of South Carolina	80	196	9	205	480	2.3
State University of South Dakota School of Medicine	44	292	5	297	2,430	8.2
University of Tennessee College of Medicine	202	731	28	759	2,371	3.1
Meharry Medical College	74	335	27	362	1,512	4.2
Vanderbilt University School of Medicine	52	679	24	703	6,205	8.8
University of Texas Southwestern Medical School	101	480	25	505	1,620	3.2
University of Texas Medical Branch	143	509	25	534	1,730	3.3
Baylor University College of Medicine	84	918	43	961	7,004	7.3
University of Utah School of Medicine	57	309	3	312	1,879	6.0
University of Vermont College of Medicine	51	303	17	320	2,631	8.2
University of Virginia School of Medicine	76	535	30	565	4,017	7.1
Medical College of Virginia	85	384	21	405	2,387	5.9
University of Washington School of Medicine	75	400	23	423	2,681	6.3
West Virginia University School of Medicine	41	109	5	114	351	3.1
University of Wisconsin Medical School	101	192	17	209	688	3.3
Marquette University School of Medicine	105	752	27	779	5,857	7.5
TOTAL	8,128	55,803	3,299	59,102*		3.9

* Total number of applications, not applicants, filed to all medical schools. Total number of individuals applying for entrance to Fall 1958 class was 15,170. Average applications per applicant were 3.9.

From the upcoming "Study of Applicants," Association of American Medical Colleges.

with relatively little change until 1958-1959. This may not indicate a continuing downward trend any more than the relative rise during the three years beginning 1954-1955 indicated a continuing upward trend in proportion of applicants to places.

TABLE 23.—*Number of Applicants to Medical Schools, 1948-1959*

Year	Individual Applicants, No.	Ratio of First-Year Class to Total Applicants
1948-1949	24,242	3.62
1949-1950	24,434	3.47
1950-1951	22,279	3.10
1951-1952	19,920	2.68
1952-1953	16,763	2.26
1953-1954	14,678	1.97
1954-1955	14,588	1.92
1955-1956	14,987	1.94
1956-1957	15,918	1.99
1957-1958	15,791	1.97
1958-1959	15,170	1.86

It is a matter deserving of study in order that any sharp diminution in applicants that may be significant will be noted early enough to permit additional career guidance efforts to be directed toward highly capable young people.

The 12 Canadian medical schools had in 1958-1959 a slightly smaller total enrollment in the four medical school years than was reported a year ago. Though five schools had increased enrollments (Toronto and Montreal had the largest increases, each about 3.5%), seven had decreased total enrollments, of which the more significant changes were Saskatchewan, down 7%; Laval, down 5%; McGill and Manitoba, each down about 3.5%. Comparative data are presented in table 24 for enrollments in previous years in the Canadian medical schools. The median enrollment in 1958-1959 was 227 students and the average 306, nearly identical with the figures reported one year ago. Data on the applicants and applications to Canadian schools were not available.

GEOGRAPHICAL SOURCE OF ENTERING STUDENTS

The residence of students at the time of their enrollment in the medical schools in the United States is shown in table 25 based on the 1958-1959 enrollment data.

Of all first-year medical students, more than one-third (37%) came from five states (New York, Pennsylvania, California, Ohio, and Illinois). As was the case for the past three years, 41% of the entering class came from six states (those above and Texas) and their 32 schools enrolled 40% of the class. Michigan contributed an equal number of students as did Texas (342). Those seven states originated about 46% of the total entering medical class in 1958-1959, and the 34 medical schools in the seven states enrolled 44% of the total first-year class. Forty per cent of all medical schools in the United States are located in the same seven states.

There were fewer than 20 first-year medical students from each of seven states (Alaska, Delaware, Maine, Nevada, New Mexico, Vermont, and Wyoming) and fewer than 30 from two other states (New Hampshire and Rhode Island). Of these nine states, only New Hampshire and Vermont have medical schools. The 74 students from the seven states originating the fewest students and the 43 students from the other two states together comprise only 1.4% of the total first-year class, 83 students and 1.0% less than in the 1957-1958 academic year.

In table 26 are listed the states in ascending order according to the number of enrolled first-year medical students per 100,000 population. As was the case in the previous two academic years, the seven states originating the largest number of first-year students are distributed throughout the list. With the sole exception of Nevada, the other eight states having the smallest number of first-year students enrolled in medical schools had relative to the population fewer students than the median number (4.45). As compared with last year, Vermont slipped from 5.0 to 3.0 and Wyoming from 5.5 to 2.5, on the basis of 14 fewer students from Vermont and 9 fewer from Wyoming. Nevada jumped from 3 students in 1957-1958 to 10 in 1958-1959, changing its ratio from 1.2 to 5.0. Five other states have shown a change in their relation to the median number, three (Idaho, Kentucky, Maryland) having risen from below to above, while Connecticut and Florida have gone from above the median to below. Though others have shown changes in ratio of medical students to population, their position in the rank order has not changed remarkably.

The over-all ratio of students per 100,000 population, excluding members of the armed forces, was 4.6, 0.1 less than in 1957-1958. The number of first-year medical students enrolled in 1958-1959 did not quite keep pace with the total population growth, even though the class was 92 students larger than in the previous year.

There were six schools, all publicly owned, that enrolled as first-year medical students only those resident in the state in which the school is located.

TABLE 24.—*Schools, Students, and Graduates in the Medical and Basic Medical Science Schools in Canada, 1948-1959*

	Schools	1st Year	2nd Year	3rd Year	4th Year	Total	Graduates
1948-1949	10	887	765	842	739	3,233	679
1949-1950	10	897	798	761	822	3,278	791
1950-1951	11	960	880	844	805	3,489	858
1951-1952	11	873	891	858	836	3,458	783
1952-1953	11	918	809	865	852	3,444	825
1953-1954	12	982	901	844	916	3,643	896
1954-1955	12	908	903	881	837	3,589	894
1955-1956	12	1,035	883	877	856	3,651	816
1956-1957*	12	1,001	934	855	865	3,655	893
1957-1958	12	1,012	916	928	830	3,686	828
1958-1959	12	986	911	867	901	3,668	859

* The remaining school of the basic medical sciences (Saskatchewan) became a four-year school with students in all years.

An additional six publicly owned schools each enrolled only one nonresident student, less than 1% of their classes. Four additional publicly owned schools had fewer than 5% nonresidents in their entering classes. A total of 16 publicly owned schools (or 40% of all publicly owned medical schools) each had fewer than 5% of their entering classes composed of students from other states (17 students in all). Table 27 provides information on out-of-state enrollments for 1958-1959 as compared with 1957-1958. A special study of the effect of geographical restrictions on attrition for poor scholarship was published one year ago in the 58th annual report, Medical Education in the United States and Canada.[11]

Because of a change in the manner of collecting information for the 1958-1959 year, the residence of entering students in the 12 Canadian medical schools was not available.

COLLEGE RECORD OF FIRST-YEAR MEDICAL CLASS

Table 28 presents comparative data of the college scholastic record of the entering classes in medicine since 1950-1951. There is no significant change in the past year or, indeed, since 1953-1954. At least two-thirds of the entering classes comprise "B" average students. About one-sixth had college grade averages of "A" and about one-sixth to one-seventh had "C" averages. Four of the 85 schools, privately owned, did not report on the college record of their first-year classes in 1958-1959. In 1958-1959, 27 schools had more than the average proportion (16.0%) of "A" students and 54 schools had a smaller proportion. Sixteen of the 27 schools are privately owned and 11 publicly owned. The range was extremely wide, from 0 to 57% of "A" students in various first-year classes. Only one school had no such students, while four schools had more than 40% of their entering classes consisting of "A" students. Of the 81 schools that reported, 47 had a smaller proportion of "C" average students than the average (14.3%), while 34 schools had a larger proportion. The range was wide; from 0 to 59% of the classes entering various schools were composed of "C" students. Six schools had no students in this category. Five schools had more than 40% of their first-year classes composed of students having "C" college records. All of the five have geographical or other rigorous restrictions on choice of student body from among applicants.

A year ago, in the 58th Annual Report,[11] a special study of the significant relationship of geographical restriction to medical student attrition for academic failure was presented.

It should be pointed out to others than admissions committee members, who already are acutely aware of this, that there are differences among colleges in the relationship of a given grade average to scholastic achievement. For instance, scholastic achievement in one college that is awarded a "B" grade might in another college be given a "C" grade and similarly, though to a lesser degree, in the case of "A" and "B" grades. The scholastic record in college is one factor among many that are considered in the selection of students by medical school faculties.

The college grade averages of students entering the first medical year of the Canadian medical schools in 1958-1959 is also presented in table 28. There is a somewhat smaller proportion of students having "B" college records, and a larger proportion of the entering class having "A" as well as "C" records than in United States schools. There was less variation among the Canadian schools in the proportions of students having different college records than was the case in United States schools. Seven Canadian schools had a greater proportion than the average (17.9%) of entering students having "A" college records. The range, however, for all 12 schools is 7.9 to 38.2%. Only one school had more than 30% of the class composed of "A" students, although three additional schools had 25% or more such students in their entering medical classes. Six schools had less than the average proportion (23.8%) of "C" students. The range for the 12 schools of proportions of "C" students was 3.3 to 46%. Only one school had more than 40% of the class composed of such students.

PREPROFESSIONAL ATTAINMENTS OF THE ENTERING CLASS

Table 29 presents by school the preprofessional educational attainments of the 1958-1959 entering class. Table 30 provides comparative data for previous years with the 1958-1959 year. It is apparent that the trend toward longer college education prior to entering medical school is a continuing one if one considers together those who have completed four years of college and those students having a college degree. Twenty-two years ago, 61% of first-year medical students were in that category, whereas in 1958-1959 80.4% of entering medical students have either completed four years of college or have earned one (or more) college degrees. As table 30 shows, there has been an increase of 5.5% of the class in this group in the past five years. About four-fifths of the first-year class have had such attainments during the last two years. It is likely that as such schools as Stanford, Boston University, and Johns Hopkins implement their new programs interdigitating college and medical school education, this trend will be reversed when a sufficient number of students are involved. This will also depend on whether, in relation to such innovations in medical education, the definition of a first-year medical student is altered from its present sense of a student who is four years removed from the M.D. degree.

TABLE 25.—*Geographical Source of Entering Students in Medical*

School	1 Alabama	2 Alaska	3 Arizona	4 Arkansas	5 California	6 Colorado	7 Connecticut	8 Delaware	9 District of Columbia	10 Florida	11 Georgia	12 Hawaii	13 Idaho	14 Illinois	15 Indiana	16 Iowa	17 Kansas	18 Kentucky	19 Louisiana	20 Maine	21 Maryland
1 Medical College of Alabama	72	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..
2 University of Arkansas School of Medicine	..	..	..	96	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3 College of Medical Evangelists	..	..	2	..	42	1	..	..	..	..	1	..	..	1	..	..	..	..	2	..	3
4 University of California School of Medicine, Los Angeles	..	..	4	..	51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5 University of Southern California School of Medicine	..	..	1	..	62	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
6 Stanford University School of Medicine	..	..	3	..	48	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..
7 University of California School of Medicine, San Francisco	..	..	3	..	97	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
8 University of Colorado School of Medicine	..	1	1	..	..	78	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9 Yale University School of Medicine	..	..	2	..	4	1	13	1	..	..	1	..	2	..	1	..	1	..	1	3	..
10 Georgetown University School of Medicine	..	..	..	..	1	..	5	..	14	1	1	..	..	..	..	1	..	..	1	3	..
11 George Washington University School of Medicine	..	..	..	..	18	..	..	1	15	1	..	..	7	3	..	..	..	..	..	5	..
12 Howard University College of Medicine	2	1	3	1	5	..	..	1	14	4	2	..	..	6	1	1	..	..	2	3	..
13 University of Miami School of Medicine	..	..	..	..	..	..	..	..	..	71	..	..	..	..	..	..	..	..	..	..	..
14 University of Florida College of Medicine	..	..	..	..	..	..	1	..	..	42	2	..	..	..	..	..	..	..	..	..	..
15 Emory University School of Medicine	4	..	..	..	..	..	1	..	..	15	41	..	..	..	1	..	..	..	..	..	..
16 Medical College of Georgia	..	..	..	..	..	..	..	..	..	..	101	..	..	..	..	..	..	..	..	..	..
17 Chicago Medical School	..	..	..	..	1	..	1	..	2	1	..	..	..	8	..	..	..	..	..	..	..
18 Northwestern University Medical School	..	..	..	..	5	2	1	..	..	1	..	1	1	53	5	3	1	2	1	..	1
19 Stritch School of Medicine of Loyola University	..	..	..	..	5	..	1	..	..	..	..	..	..	37	3	..	..	1	..	..	1
20 University of Chicago, The School of Medicine	..	..	..	..	6	..	..	1	..	..	1	..	..	34	4	..	..	..	..	..	..
21 University of Illinois College of Medicine	..	..	..	..	1	..	..	..	..	..	..	..	..	200	..	..	..	..	..	..	..
22 Indiana University School of Medicine	..	..	..	..	..	..	..	..	..	1	..	1	..	2	148	..	1	1	..	..	..
23 State University of Iowa College of Medicine	..	..	..	..	..	..	..	..	..	1	..	..	..	5	..	112	..	..	..	..	..
24 University of Kansas School of Medicine	..	..	1	..	..	..	1	..	..	..	..	..	..	..	3	..	83	..	..	..	..
25 University of Louisville School of Medicine	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	87	..	..	..
26 Louisiana State University School of Medicine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	128	..	..
27 Tulane University School of Medicine	18	..	6	3	1	..	..	..	..	7	1	2	..	2	..	1	..	3	30	..	..
28 Johns Hopkins University School of Medicine	1	..	..	1	1	..	2	..	1	2	1	..	..	5	2	..	..	2	..	13	..
29 University of Maryland School of Medicine	..	..	..	..	1	..	1	..	1	..	..	..	..	1	..	..	..	..	1	79	..
30 Boston University School of Medicine	..	..	..	..	6	..	1	..	1	..	2	..	..	..	..	..	..	..	..	1	1
31 Harvard Medical School	..	..	..	..	4	3	3	1	..	1	1	1	..	5	3	..	..	..	..	1	1
32 Tufts University School of Medicine	..	..	..	..	..	..	16	1	..	..	..	..	..	..	..	..	..	..	1	..	1
33 University of Michigan Medical School	..	..	..	..	2	2	1	..	..	1	..	1	1	2	..	1	..	..	..	..	..
34 Wayne State University College of Medicine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
35 University of Minnesota Medical School	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
36 University of Mississippi School of Medicine	..	..	..	..	..	..	..	..	2	..	..	..	..	1	..	..	..	..	..	1	..
37 University of Missouri School of Medicine	..	..	..	..	2	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..
38 Saint Louis University School of Medicine	1	..	2	1	20	2	3	..	..	..	2	1	11	3	3	2	2	1	..	..	..
39 Washington University School of Medicine	..	..	2	..	7	1	..	..	1	4	..	..	3	5	1	1	1	..	..	..	2
40 Creighton University School of Medicine	..	..	1	..	15	2	1	..	..	..	..	1	1	1	..	12	1	..	..	..	..
41 University of Nebraska College of Medicine	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
42 Dartmouth Medical School	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..
43 Seton Hall College of Medicine and Dentistry	..	..	..	..	..	5	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
44 Albany Medical College of Union University	..	..	..	..	2	..	2	..	1	..	..	..	..	1	..	1	..	..	..	..	1
45 University of Buffalo School of Medicine	..	..	..	..	2	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
46 Albert Einstein College of Medicine of Yeshiva University	..	..	..	..	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	1
47 Columbia University College of Physicians and Surgeons	..	..	..	..	2	..	4	..	3	1	..	..	3	1	..	..	1	1	..	..	1
48 Cornell University Medical College	..	..	2	..	6	..	1	1	1	1	..	1	1	1	..	..	1	..	..	..	..
49 New York Medical College, Flower and Fifth Avenue Hospitals	..	..	..	..	4	..	10	1	..	..	1	..	..	1	..	..	..	..	..	..	..
50 New York University College of Medicine	..	..	..	..	1	..	2	..	..	..	..	..	..	..	..	..	..	..	..	3	..
51 State University of New York Downstate Medical Center, New York City	..	..	..	..	..	..	2	..	..	..	..	..	..	1	..	..	..	..	..	..	..
52 University of Rochester School of Medicine and Dentistry	..	..	..	..	1	..	1	..	1	..	..	1	..	1	..	..	..	..	..	..	..
53 State University of New York Upstate Medical Center, Syracuse	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
54 University of North Carolina School of Medicine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
55 Duke University School of Medicine	1	..	..	..	1	..	..	..	..	5	4	..	..	..	1	..	1	2	..	..	1
56 Bowman Gray School of Medicine of Wake Forest College	..	..	..	..	1	..	..	..	..	..	2	..	..	..	..	..	..	3	..	..	..
57 University of North Dakota School of Medicine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
58 University of Cincinnati College of Medicine	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	..	..	6	..	..	..
59 Western Reserve University School of Medicine	..	..	..	..	3	3	2	..	1	2	..	..	..	4	1	..	..	..	..	..	1
60 Ohio State University College of Medicine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
61 University of Oklahoma School of Medicine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
62 University of Oregon Medical School	..	1	1	..	3	..	..	..	..	..	..	1	2	..	1	..	..	..	..	..	..
63 Hahnemann Medical College and Hospital of Philadelphia	..	..	..	..	2	..	1	..	..	..	2	..	..	1	..	..	..	..	..	..	1
64 Jefferson Medical College of Philadelphia	..	..	1	..	..	..	1	3	1	1	..	1	..	..	..	1	..	..	..	..	..
65 Temple University School of Medicine	1	..	..	..	..	..	..	2	1	1	..	..	1	1	..	..	..	..	..	..	1
66 University of Pennsylvania School of Medicine	..	..	..	..	2	1	..	2	1	..	..	..	..	..	1	..	..	2	..	..	2
67 Woman's Medical College of Pennsylvania	..	..	..	..	1	..	..	1	..	..	..	..	..	1	1	..	..	1	..	..	..
68 University of Pittsburgh School of Medicine	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..
69 University of Puerto Rico School of Medicine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
70 Medical College of South Carolina	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
71 State University of South Dakota School of Medicine	..	..	1	..	1	1	..	..	..	..	..	..	1	1	..	8	..	..	..	..	..
72 University of Tennessee College of Medicine	3	..	4	6	..	..	..	..	..	3	2	..	..	1	..	..	..	5	1	..	..
73 Meharry Medical College	6	..	..	1	1	..	1	..	..	3	5	..	3	..	..	..	..	1	5	..	2
74 Vanderbilt University School of Medicine	3	..	..	3	1	..	..	..	..	1	3	..	..	..	..	..	..	15	..	..	..
75 University of Texas Southwestern Medical School	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
76 University of Texas Medical Branch, Galveston	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
77 Baylor University College of Medicine	..	..	1	1	12	1	..	..	..	1	..	1	..	2	..	..	1	..	..	..	..
78 University of Utah School of Medicine	..	..	3	..	2	..	..	..	..	..	..	..	7	1	..	..	..	..	..	..	..
79 University of Vermont College of Medicine	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	5	..
80 University of Virginia School of Medicine	..	..	..	..	1	..	1	..	2	..	1	..	..	..	..	..	..	..	..	..	3
81 Medical College of Virginia	..	..	..	..	..	..	2	..	..	..	..	..	..	..	1	..	..	..	..	..	1
82 University of Washington School of Medicine	..	1	..	..	1	..	..	..	..	..	..	1	3	1	..	..	..	..	..	..	..
83 West Virginia University School of Medicine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
84 University of Wisconsin Medical School	1	..	..	..	..	1	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..
85 Marquette University School of Medicine	..	..	1	..	14	..	..	..	..	..	1	..	6	..	2	..	..	..	..	..	..
Totals	108	4	45	112	464	97	98	18	62	174	173	23	30	413	190	148	93	137	172	14	131
Marginal No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	
Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Puerto Rico	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Guam, Panama and Others	Canada	Foreign	Home State	Out of State	Totals	Marginal Number
1	1	..	..	..	..	..	..	..	1	..	2	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	72	9	81	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	95	0	95	2
1	2	1	1	..	..	2	2	..	..	..	4	..	..	5	3	4	..	1	..	..	1	2	4	..	..	1	12	..	1	..	..	3	12	42	72	114	3
1	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	51	5	56	4
..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	62	6	68	5
..	..	..	1	..	..	1	..	..	1	1	1	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	48	13	61	6
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	97	4	101	7
..	..	..	..	..	..	..	..	..	..	8	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	73	13	86	8
13	1	..	..	1	..	..	..	1	5	..	18	..	..	3	1	1	5	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	13	68	81	9
10	2	..	..	..	..	..	..	..	19	..	30	..	..	7	..	..	7	1	3	..	..	..	..	..	..	..	3	1	..	..	..	..	2	14	98	112	10
8	1	1	..	..	1	1	1	..	8	1	12	..	..	1	..	1	10	..	..	..	..	..	..	1	..	5	2	1	1	..	..	..	..	15	86	101	11
2	1	1	..	3	..	..	..	..	4	..	15	..	..	2	..	..	10	..	..	..	4	..	2	..	..	..	9	..	..	..	..	..	10	14	91	105	12
..	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	71	4	75	13
..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	1	42	8	50	14
..	..	..	..	..	..	..	..	..	3	..	..	..	..	1	..	..	..	..	..	2	..	4	1	..	..	1	..	..	..	..	..	..	..	41	33	74	15
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	101	1	102	16
2	..	..	..	..	..	..	..	..	7	..	47	..	..	1	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8	64	72	17
1	5	4	..	4	..	2	..	..	4	2	7	..	..	11	..	..	2	..	..	..	1	..	..	1	..	1	1	5	1	..	1	2	53	79	132	18
2	4	..	..	2	2	..	..	..	9	..	8	..	..	11	..	1	3	..	..	..	..	..	..	..	..	..	..	2	..	..	1	2	37	51	88	19
..	3	2	1	..	..	..	..	..	3	..	4	..	..	6	1	..	1	..	..	..	1	1	..	..	..	..	..	..	1	..	..	..	..	34	39	73	20
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	200	1	201	21
..	1	..	..	..	..	..	2	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	1	148	12	160	22
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	112	8	120	23
..	..	..	..	10	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	83	15	98	24
..	..	..	..	..	..	..	..	..	1	..	4	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	87	13	100	25
..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	128	1	129	26
..	..	18	3	..	..	..	..	..	4	1	5	1	..	2	1	..	..	..	..	2	..	1	16	..	..	1	..	1	..	..	..	9	30	104	134	27
2	1	..	..	..	1	1	1	1	4	..	16	2	..	1	..	1	..	1	..	1	3	1	..	..	..	1	..	1	..	..	..	..	1	13	61	74	28
1	..	..	..	1	..	1	..	1	2	..	1	..	..	1	..	1	5	..	1	..	..	..	..	1	..	..	1	..	..	..	..	..	..	79	21	100	29
41	..	2	..	..	..	..	..	..	3	..	10	..	..	2	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	2	41	33	74	30
20	3	..	..	..	1	..	..	..	3	..	32	4	..	8	1	..	9	..	1	..	1	..	..	..	..	1	1	1	..	..	..	1	30	94	114	31
51	..	..	..	2	..	..	..	4	3	..	21	..	..	1	..	..	1	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	51	63	114	32
..	169	..	..	..	..	..	1	..	1	..	5	..	..	7	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	1	169	28	197	33
..	124	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	124	1	125	34
..	..	136	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	136	3	139	35
..	..	..	74	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	74	4	78	36
..	..	..	..	76	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	76	0	76	37
4	2	3	..	18	3	..	1	1	3	..	7	..	1	10	1	..	1	..	..	..	..	1	3	1	..	..	3	..	2	..	..	7	18	108	126	38
1	2	..	2	33	..	1	..	..	1	1	4	1	..	4	2	3	1	..	..	..	..	1	9	..	..	..	1	..	..	1	..	..	..	23	63	86	39
..	..	3	..	1	2	13	1	..	2	..	6	..	..	2	..	1	..	..	2	..	6	..	..	..	..	..	..	..	1	..	..	2	13	64	77	40
..	..	..	..	1	..	75	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	75	6	81	41
1	1	2	..	..	1	..	..	..	4	..	7	1	..	2	..	..	2	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	0	24	24	42
4	..	..	..	..	..	..	..	..	44	..	23	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	44	36	80	43
1	..	..	..	..	..	..	..	..	10	..	11	..	..	2	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	41	24	65	44
..	..	..	..	..	..	..	..	..	2	..	7	..	..	3	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	77	11	88	45
1	..	..	..	..	..	..	..	..	7	..	8	1	..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	80	16	96	46
3	..	..	..	2	..	..	..	..	17	..	17	..	..	11	..	..	7	..	..	..	1	..	..	..	..	..	1	..	3	..	..	1	57	63	120	47
..	1	..	..	..	..	1	..	..	12	..	11	..	..	8	..	..	2	..	..	..	..	2	..	..	..	1	..	..	1	..	..	..	41	45	86	48
14	..	1	..	..	..	..	..	..	21	..	6	..	..	3	..	..	3	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	67	60	127	49
4	..	..	..	..	..	..	..	..	18	..	16	..	..	3	1	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	96	36	132	50
2	..	..	..	..	..	..	..	..	5	..	143	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	3	..	..	2	143	11	154	51
2	1	..	..	..	..	..	..	..	4	..	44	..	..	6	..	1	1	..	..	..	..	..	1	..	..	..	..	..	3	..	..	1	44	25	69	52
2	2	..	..	..	..	..	..	..	5	..	77	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	77	10	87	53
1	..	..	..	..	..	..	..	..	..	..	..	69	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	69	1	70	54
3	1	..	..	..	..	..	..	..	5	..	9	23	..	2	..	..	2	2	..	4	..	1	3	..	..	4	..	3	1	..	..	..	23	56	79	55
..	1	..	..	..	..	..	..	..	1	..	3	32	..	..	..	..	..	..	1	1	..	1	..	1	..	2	..	2	1	..	..	3	32	23	55	56
..	..	2	..	..	4	..	..	..	..	..	..	..	34	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	34	7	41	57
1	..	..	..	1	1	..	..	..	2	..	6	..	..	72	..	..	4	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	72	20	92	58
2	4	1	..	..	..	..	..	..	..	..	..	..	..	42	1	..	1	..	1	..	..	..	..	..	..	..	1	..	..	..	..	2	42	36	78	59
..	..	..	..	..	..	..	..	..	..	..	..	..	150	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	150	1	151	60
..	..	..	..	..	..	..	..	..	..	..	..	..	..	100	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	100	0	100	61
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	66	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	66	14	80	62
..	..	..	..	..	2	..	2	..	..	..	..	..	..	2	..	..	79	..	1	..	..	..	..	..	..	..	..	..	1	..	..	1	79	30	109	63
1	..	..	..	..	..	..	..	..	25	..	4	1	..	1	..	..	124	..	1	..	..	..	2	1	..	2	..	3	..	..	..	1	124	51	175	64
2	..	..	..	..	..	..	..	..	10	..	3	..	..	2	..	..	108	1	..	..	..	..	..	..	..	1	..	..	..	..	..	1	108	28	136	65
1	..	..	..	..	..	..	..	..	9	..	5	2	..	2	1	..	88	..	..	..	1	..	..	1	..	2	..	1	2	..	..	..	88	38	126	66
3	..	..	..	..	..	..	..	..	3	..	20	..	..	2	..	1	14	..	..	..	..	..	..	1	..	..	1	..	..	..	1	..	14	37	51	67
..	..	..	..	..	..	..	..	..	1	..	7	..	..	6	..	..	88	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	83	18	101	68
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	55	0	55	69
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	80	..	..	..	..	..	..	..	..	..	..	..	..	..	80	0	80	70
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	23	..	..	..	..	..	1	..	2	..	..	1	23	21	44	71
..	..	2	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	146	5	..	..	..	..	..	..	..	..	..	146	56	202	72
..	..	..	5	7	..	..	..	..	..	1	..	6	..	..	5	..	..	..	..	4	..	7	10	..	..	4	..	..	..	..	..	3	7	67	74	73
1	2	..	2	1	..	..	..	..	2	..	2	5	..	2	..	..	1	..	..	1	..	12	1	..	..	1	..	1	..	..	..	..	12	40	52	74
..	..	..	2	1	..	1	..	..	1	..	2	..	..	3	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	98	3	101	75
..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	98	1	..	..	..	..	..	..	..	..	..	142	1	143	76
..	1	2	4	2	..	1	1	..	1	2	..	..	..	1	4	..	..	..	..	..	..	2	40	..	..	1	1	..	..	..	..	1	40	44	84	77
..	..	..	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	38	..	..	..	1	..	1	..	..	..	38	19	57	78
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11	..	..	..	..	1	..	..	11	40	51	79
16	..	..	..	..	..	..	..	13	..	..	2	..	..	..	..	..	..	1	..	1	..	2	..	..	..	49	..	3	..	..	..	1	49	27	76	80
1	..	..	..	..	..	..	..	..	1	..	7	2	..	..	..	..	1	..	1	..	2	..	..	..	..	68	..	2	..	..	..	2	68	17	85	81
1	..	..	..	..	..	..	..	..	1	..	5	..	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	64	11	75	82
..	1	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	64	..	..	..	..	..	41	0	41	83
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	41	..	..	..	..	95	6	101	84
..	5	1	..	1	..	..	..	..	1	..	7	..	..	10	..	..	2	..	..	..	1	..	..	..	..	..	2	..	95	..	..	2	49	56	105	85
223	3	163	112	159	28	104	13	21	399	18	1,108	150	37	435	126	81	601	61	22	104	35	189	342	47	11	157	95	64	172	8	3	5	87	5,502	2,576	8,128	
22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	

The numbers and proportions of all medical schools in the United States having more than 90% of their entering classes comprised of students having college degrees is presented in table 31, with comparable information for previous years.

TABLE 26.—*Ratio of First-Year Medical Students to State Populations, 1958-1959*

Numbers of Students per 100,000 population* in the Approved, Newly Developing Medical and Basic Medical Science Schools of the United States.	
Maine†	1.5
New Mexico†	2.2
Alaska†	2.4
Wyoming†	2.5
Rhode Island†	2.6
Vermont	3.0
California	3.3
West Virginia	3.3
Alabama	3.4
Montana†	3.4
North Carolina	3.4
Washington	3.5
New Hampshire	3.6
Missouri	3.7
Texas	3.7
Arizona	4.0
Connecticut	4.0
Delaware†	4.0
Florida	4.0
Illinois	4.2
Indiana	4.2
Virginia	4.2
Michigan	4.4
South Carolina	4.4
Wisconsin	4.4
Kansas	4.5
Kentucky	4.5
Maryland	4.5
Georgia	4.6
Idaho†	4.6
Massachusetts	4.6
Oregon	4.6
Ohio	4.7
Minnesota	4.8
Nevada†	5.0
South Dakota	5.1
Iowa	5.2
Mississippi	5.2
New Jersey	5.4
Pennsylvania	5.4
Tennessee	5.5
Utah	5.5
Louisiana	5.6
Oklahoma	5.6
North Dakota	5.7
Colorado	5.8
Arkansas	6.4
New York	6.8
Nebraska	7.2
District of Columbia	7.7
United States‡	4.6

* Estimated July 1, 1958 total population excluding members of the Armed Forces stationed in each area. Current Population Reports, Series P-25, No. 189, November 13, 1958.

† States with no medical school.

‡ Hawaii is not included, because it was admitted to statehood after the 1958-1959 academic year.

There has been no significant change in 1958-1959 as compared to 1957-1958. Almost one-third of all 85 medical schools in the United States have more than 90% of their first-year students with college degrees.

The foregoing applies to the actual attainments of the entering class. Presumably influencing this are the minimum requirements for applicants as submitted by the medical schools to the Association of American Medical Colleges for publication in its guidebook each year.[12] Table 32 compares these requirements for the preceding two years, the 1959-1960 year, and the 1960-1961 year. It is apparent that each year more schools require four years of college or a degree as their minimum stipulated to applicants. There has, however, been relatively little change for applicants to classes beginning in 1959-1960 and 1960-1961. In the requirements recently published for the class to be admitted in the 1960-1961 year, of the 71 schools requiring at least three years of college, 7 prefer four years of college for their applicants. Of the 9 schools requiring four years of college, one school prefers that its applicants have college degrees. Thus, if the preferences stated were strong ones, it might be more accurate to state that 4 schools will in effect require degrees and an additional 17 schools will in effect require four years of college prior to entering medical school. These 21 schools constitute almost one-fourth of all the medical schools in the United States. Fourteen of the 21, or two-thirds, are privately owned medical schools; the remainder are publicly owned.

Of the 12 Canadian medical schools, the stated admission requirements of nine are three years of college (or two years of college after grade 13), although one of these strongly prefers four years of college (or three years after grade 13), while the other three schools require four years of college. The actual preprofessional attainments of the entering classes were not available.

STUDENTS ADMITTED INTO ADVANCED STANDING

A total of 258 students were admitted into advanced standing in 1958-1959 in 56 medical schools in the United State. Of these, 124 were transfer students from two year schools of the basic medical sciences, 97 were from four-year United States medical schools, 30 were from schools outside the United States and Canada, and 7 were from pharmacy or dental or university graduate schools in the United States. Forty-eight were admitted into second-year classes, 207 transferred to third-year classes, and 3 students transferred into fourth-year classes.

Almost one-half (48%) of the admissions into advanced standing were occasioned by students completing the second year in the four schools of basic medical sciences transferring into the third year of four-year medical schools. Two schools took more than one-third (38%) of such students: Medical College of Virginia (26 students) and Harvard (21). The six schools taking an additional one-third of the students from two year schools into the third year were Nebraska (8), Iowa (7), Kansas (7), Northwestern (7), Texas Southwestern (7), and

Pennsylvania (6). Six of these eight schools, excepting Iowa and Nebraska, accounted for 60% of the students from two-year schools in 1958-1959, nearly the same as in the previous year. The remaining 35 students were accepted into third-year classes of 15 other medical schools in the United States. All students graduated from the schools of basic medical sciences were admitted into third-year classes of the 23 four-year medical schools.

The 48 students admitted to advanced standing into second-year classes of 33 medical schools consisted of 13 foreign students admitted by 11 schools, 27 from United States medical schools, and 8 from graduate or dental schools in the United States.

Sixteen of the transfer students from medical schools outside the United States and Canada were admitted into third-year classes of nine medical schools, and one foreign student was admitted into a fourth-year class.

TABLE 27.—*Out-of-State Enrollments of Entering Medical School Class*

% of Class Non-Resident	1957-1958			1958-1959		
	Number of Schools		Number of Non-Resident Students Taken into Publicly Owned Schools	Number of Schools		Number of Non-Resident Students Taken into Publicly Owned Schools
	Privately Owned	Publicly Owned		Privately Owned	Publicly Owned	
0	0	7	0	0	6	0
<5	1	11 (25 Schools)	25 (79 Students)	0	10 (23 Schools)	17 (69 Students)
5-10	1	7	64	2	7	52
10-20	6	7	70	4	10	190
Total	8	32	159	6	33	259

ATTRITION OF MEDICAL STUDENTS

There has been a change in the method of securing attrition data for the 1958-1959 year as compared with previous years. Previously, questions in the annual questionnaire to medical schools included request for numbers of students leaving medical school for poor scholarship and numbers leaving for other reasons, although in good academic standing. However, for the 1958-1959 year, attrition data were secured from the change of status reports received throughout the year from medical schools in the United States. Decisions regarding the students to include in attrition data and who to omit (such as those withdrawing for a year from medical school for advanced study) were made in a single office rather than in 85 medical school offices. Whether the data are entirely comparable with previous years is thus uncertain.

The information on student loss to medicine is presented in table 33. Included are those who withdrew or were dismissed because of poor academic standing and those who withdrew or were dismissed from medical school for other reasons. Not included in the attrition figures are students withdrawing for special study or research, students who transferred to another medical school, and students who changed their status from full to part time.

There appears to be little significant change as compared with the 1957-1958 academic year. If one compares attrition due to poor scholarship for the years 1954-1955 to 1957-1958 inclusive, there appears to be a slight increase each year, predominantly in the freshman and sophomore classes. The 1958-1959 figures appear to interrupt this trend. It is possible that students were included in attrition data previously that were not included in the 1958-1959 year, so that a different base line may have been introduced for the current data. With similar reservations regarding comparability of data, there was a slight increase in the proportion of first year students in good academic standing withdrawing or dismissed for other reasons. This almost exactly offsets the decline in proportion of students dismissed for poor academic standing so that the over-all attrition was almost the same for 1958-1959 (3.4%) as for 1957-1958 (3.3%).

As was the case in previous years, in 1958-1959 about two-thirds (68%) of all student losses were in the first-year class. Of these losses, 63% were due to failure or withdrawal in poor academic standing. The second-year class in 1958-1959 had 59% of its losses from this cause. In the third-year and fourth-year classes, 27% of the students lost to medicine either failed or withdrew in poor academic standing.

The fact that 73% of the 108 students lost to medicine in their third and fourth years were for non-academic reasons should occasion special concern. One possible cause might be financial. It is hoped

TABLE 28.—*Comparative Analysis of College Records of First-Year Medical Students**

College Grade Average First-Year Medical Students	United States									Canada
	1950-1951	1951-1952	1952-1953	1953-1954	1954-1955	1955-1956	1956-1957	1957-1958	1958-1959	1958-1959
3.6-4.0 (A)	40	30	18.0	21.1	16.8	15.8	16.1	17.7	16.0	17.9
2.6-3.5 (B)	43	55	67.5	68.9	69.0	70.6	69.9	66.0	69.7	58.3
1.0-2.5 (C)	17	15	14.5	10.0	14.2	13.6	14.0	16.3	14.3	23.8

* Based on returns from 81 medical schools.

that data may be secured for the 1959-1960 academic year regarding the relative importance of the financial factor among the "other reasons" for students leaving medical school despite good academic standing. Although the proportion of these

GRADUATES

The graduating class awarded the M.D. degree in 1958-1959 numbered 6,860, one fewer than in 1957-1958. These two classes of graduates were the largest except for the 1954-1955 year when

TABLE 29.—*Preprofessional Education of First-Year Medical Students in the United States, 1958-1959*

	Size of First-Year Class	Less than Three Years of College	Three Years of College	Four Years of College	Degree	Advanced Degree	% with Degrees
Medical College of Alabama	81	..	15	8	56	2	69.1
University of Arkansas	95	..	42	13	38	2	42.1
College of Medical Evangelists	114	..	..	3	110	1	97.4
University of California, Los Angeles	56	..	5	2	47	2	87.5
University of Southern California	68	..	14	8	42	4	67.6
Stanford University	61	..	17	2	38	4	68.9
University of California, San Francisco	101	..	43	11	45	2	46.5
University of Colorado	86	..	23	15	44	4	55.8
Yale University	81	..	12	2	64	3	82.7
Georgetown University	112	1	4	6	95	6	90.2
George Washington University	101	..	26	6	67	2	68.3
Howard University	105	..	1	2	95	7	97.1
University of Miami	75	..	18	7	46	4	66.7
University of Florida	50	..	4	3	43	..	86.0
Emory University	74	1	20	2	49	2	68.9
Medical College of Georgia	102	..	22	6	71	3	72.5
Chicago Medical School	72	..	..	..	67	5	100.0
Northwestern University	132	..	28	7	90	7	73.5
Stritch School of Medicine of Loyola University	88	..	39	8	41	..	46.6
University of Chicago	73	..	13	7	52	1	72.6
University of Illinois	201	..	106	13	78	4	40.8
Indiana University	160	..	76	24	58	2	37.5
State University of Iowa	120	..	63	13	43	1	36.7
University of Kansas	98	..	..	2	93	3	98.0
University of Louisville	100	..	10	..	88	2	90.0
Louisiana State University	129	..	45	19	61	4	50.4
Tulane University	134	..	66	13	55	..	41.0
Johns Hopkins University	74	..	..	..	70	4	100.0
University of Maryland	100	..	2	7	89	2	91.0
Boston University	74	..	2	3	63	6	93.2
Harvard Medical School	114	..	1	1	111	1	98.2
Tufts University	114	..	1	2	111	..	97.4
University of Michigan	197	..	90	6	95	6	51.3
Wayne State University	125	..	37	16	68	4	57.6
University of Minnesota	139	..	43	21	72	3	54.0
University of Mississippi	78	..	23	20	33	2	44.9
University of Missouri	76	..	17	7	51	1	68.4
St. Louis University	126	..	9	15	101	1	81.0
Washington University	86	..	14	2	70	..	81.4
Creighton University	77	..	27	7	42	1	55.8
University of Nebraska	81	..	33	15	31	2	40.7
Dartmouth Medical School	24	..	22	1	1	..	4.2
Seton Hall College of Medicine	80	..	4	2	74	..	92.5
Albany Medical College of Union University	65	1	4	..	59	1	92.3
University of Buffalo	88	..	8	7	71	2	83.0
Albert Einstein College of Medicine of Yeshiva University	96	..	..	1	93	2	90.0
Columbia University	120	..	..	1	114	5	99.2
Cornell University	86	..	5	2	79	..	91.9
New York Medical College	127	..	1	3	119	4	96.9
New York University	132	..	9	1	117	5	92.4
State University of New York, Downstate Medical Center, New York City	154	..	10	2	136	6	92.2
University of Rochester	69	..	3	..	64	2	95.7
State University of New York, Upstate Medical Center, Syracuse	87	..	7	4	73	3	87.4
University of North Carolina	70	..	12	4	53	1	77.1
Duke University	79	..	10	2	65	2	84.8
Bowman Gray School of Medicine of Wake Forest College	55	..	2	4	49	..	89.1
University of North Dakota	41	..	14	3	24	..	58.5
University of Cincinnati	92	..	3	..	87	2	95.7
Western Reserve University	78	..	4	3	64	7	91.0
Ohio State University	151	..	6	15	123	7	86.1
University of Oklahoma	100	..	38	13	47	2	49.0
University of Oregon	80	..	32	15	32	1	41.3
Hahnemann Medical College	109	..	5	9	89	6	88.0
Jefferson Medical College	175	..	6	2	162	5	95.4
Temple University	136	..	3	5	126	2	94.1
University of Pennsylvania	126	..	..	1	125	..	99.2
Woman's Medical College of Pennsylvania	51	..	1	2	47	1	94.1
University of Pittsburgh	101	..	4	1	94	2	95.0
University of Puerto Rico	55	..	3	8	44	..	80.0
Medical College of South Carolina	80	..	8	2	69	1	87.5
State University of South Dakota	44	..	9	4	29	2	70.5
University of Tennessee	202	..	116	11	70	5	37.1
Meharry Medical College	74	..	6	3	61	4	87.8
Vanderbilt University	52	..	7	6	37	2	75.0
University of Texas Southwestern Medical School	101	..	19	20	59	3	61.4
University of Texas Medical Branch	143	1	33	15	88	6	65.7
Baylor University	84	..	16	5	62	1	75.0
University of Utah	57	..	29	10	18	..	31.6
University of Vermont	51	..	6	..	42	3	88.2
University of Virginia	76	..	7	6	61	2	82.9
Medical College of Virginia	85	..	7	6	71	1	84.7
University of Washington	75	..	26	5	42	2	58.7
West Virginia University	41	..	8	3	27	3	73.2
University of Wisconsin	101	1	57	6	37	..	36.6
Marquette University	105	..	4	6	87	8	90.5
Totals	8,128	5	1,585	543	5,774	221	73.8
					6,538		

students was relatively large, the actual number (79) was relatively few.

Because the Canadian medical schools do not file class lists and change of status reports of their students with the Liaison Committee on Medical Education, attrition data is not available this year for students in Canadian schools.

the class was 6,977, as table 21 portrays. The bulge in 1954-1955 was occasioned by including as graduates the 50 students completing the intern year then required by Stanford University.

All except 3 of the 79 schools in the United States having graduating classes in 1958-1959 had changes in size of the graduating classes; 43 schools had

decreases and 34 schools experienced increases. The range in the former was 1 to 19% down; the range of increase was 1 to 41%.

Three schools had decreases of 15% or more: Arkansas, down 19%; College of Medical Evangelists, down 16%; and Albany, down 15%. An additional five schools experienced decreases of 10% to 15%, as follows: Rochester, down 14%; Nebraska and Texas Medical Branch, each down 13%; and Buffalo and Louisville, each down 10%.

Schools showing increases in size of graduating classes of more than 15% were Mississippi, up 41%; Stritch, up 18%; Meharry, up 17%; and Louisiana down 17%; Montreal, down 14%; and Western Ontario, down 11%. The increases in six schools more than offset the fewer graduates in six schools so that the total graduating class was 7 people more than was the case in 1957-1958.

Women comprised 5.9% of the Canadian 1958-1959 graduating class, as compared to 5.2% in the previous year.

STUDENT EXPENSES

In the 58th Annual Report [13] a year ago, estimates of expenses for medical students in the 1959-1960 class were given on the basis of data from the Association of American Medical Colleges. Table 35 presents similar information about students expenses in the 1960-1961 academic year. There appears to be no significant change. As the Association emphasizes in its presentation, the figures given should be regarded as only approximate budgetary goals. They are subject to change in the next year, and there is a considerable range within each of the categories. With tuition and fees, for example, the range is from $592 to $1,400 for private schools, $120 to $786 for residents of that state in publicly owned schools, and $360 to $1,500 for nonresidents in publicly owned schools. Living expenses of individual students vary greatly even in the same school, depending on spending habits and family responsibilities. Tuition in individual schools is included in table 1 for United States schools and table 2 for Canadian schools.

Table 36 presents for the 12 Canadian schools information on student expenses as prepared by the Association of American Medical Colleges comparable to table 35 for the United States. Tuition ranges from $393.25 to $750 for residents. Only three schools cited a nonresident fee and the top one was $859. Tuition is higher in three other schools in the upper years, as detailed in table 2.

TABLE 30.—*Comparative Data About Preprofessional Education of Classes Entering Medical School*

	1936-1937 %	1948-1949 %	1954-1955 %	1955-1956 %	1956-1957 %	1957-1958 %	1958-1959 %
Entering with degree	56.0	55.4	71.1	69.9	72.9	75.6	73.8
Entering after four years of college	61.0	63.7	74.9	74.8	77.4	79.2	80.4
	5.0	8.3	3.8	4.9	4.5	3.6	*6.6
Entering after three years of college	27.0	35.0	24.8	25.1	22.4	20.6	†19.5

* 112 or more semester hours, or 163 or more quarter hours.
† 82-111 semester hours, or 123-163 quarter hours.

TABLE 31.—*Comparison of Previous Years and the Current Year of Number and Percentage of Medical Schools Having Entering Classes Consisting Predominantly of Students with College Degrees.*

	1954-1955		1955-1956		1957-1958		1958-1959	
Entering Students with Degrees, %	No. 81	%	No. 85	%	No. 85	%	No. 85	%
100	4	4.9	6	7.0	2	2.3	2	2.3
95.1-99.9	11	13.5	14	16.4	13	15.3	12	14.1
90.1-95	7	8.6	6	7.0	12	14.1	13	15.3
Total	22	27.0	26	30.4	27	31.7	27	31.7

TABLE 32.—*Comparison of Admission Requirements for Medical School Classes Entering in Years 1957-1958 Through 1960-1961*

	Number of Schools			
Stated Admission Requirement	1957-1958	1958-1959	1959-1960	1960-1961
Less than three years college	1*	1*	1*	1*
Three years college	73	74	72	71
Four years college	4	8	10	10
	11	10	12	13
Degree	7	2	2	3
	85	85	85	85

* The same school in each instance, which has actually not admitted any first-year medical students with less than three years of college during at least the past five years.

exceeding 7,000. The University of Florida and Seton Hall College of Medicine and Dentistry will have graduating medical classes for the first time in 1959-1960. Albert Einstein College of Medicine had its first graduating class in 1958-1959.

The graduates by sex and school for Canada are also presented in table 34. Half of the 12 Canadian schools had an increase in size of the graduating classes, and the remainder had decreases. The greatest increases were at Ottawa, up 53%; Queen's up 24%; Toronto, up 23%; and Manitoba, up 22%. The largest decreases occurred in Saskatchewan, State University, up 16%. Five additional schools had increase in number of graduates of 10% or more, as follows: Howard and Oklahoma, each up 12%; and University of Southern California, Yale, and Michigan, each up 10%.

Women comprised 5.4% of the graduating class, as table 34 portrays by school. The two schools having the highest proportion of women graduates, in addition to Woman's Medical College, were the University of Chicago, 13% of class; and University of California, with 12.5% of the class women.

Based on the size of the third-year class in 1958-1959 and the usual attrition in the last two years of school, it is likely that the 1959-1960 graduating class will set a new record high in number, possibly

The reservations expressed regarding the estimates of student expenses in United States schools apply with equal force to estimates of student expenses in the Canadian schools.

MEDICAL STUDENT FINANCIAL PROBLEMS

The Council on Medical Education and Hospitals appreciates the opportunity of presenting in its report the following material prepared at its request by Dr. Leland E. Powers, Associate Director of the Association of American Medical Colleges, who utilized data from an as yet unpublished study by that Association.

The total average expenses, according to family composition, for four years in medical school were tabulated for 4,277 male members of the class. Assuming that expenses were evenly distributed for each of the four years, the average total costs per year would be approximately $2,400 for a single student; $2,800 for a married student; $3,200 for a married student with one child; and $3,900 per year for a married student having two or more children.

TABLE 33.—*Attrition in Medical Schools in the United States (85), 1958-1959*

Year	Enrollment	Withdrawal or Dismissal in Poor Academic Standing	Withdrawal or Dismissal for Other Reasons	Total	Enrollment Lost, %
First ...	8,128	434	253	687	8.4
Second .	7,432	128	89	217	2.9
Third ...	7,182	27	53	80	1.1
Fourth .	6,872	2	26	28	0.4
	29,614	591	421	1,012	3.4

The median age of the 1959 graduating medical student was 26. Sixty-two % of the graduates were married, and of the married students, 48% had one or two children and 7% had three or more children.

A sample study of medical students financial considerations in 1953 by Counts and Stalnaker [14] indicated that about one-third of the medical students expected to be in debt at graduation and 3% expected to be in debt more than $10,000. The preliminary figures for the 1959 graduating class show that 52% are actually in debt, 17% are in debt over $5,000, and 6.5% are in debt more than $10,000.

MARITAL STATUS OF MEDICAL STUDENTS

The annual questionnaire to each medical school this year included, for the first time since 1950, questions about the marital status of medical students. Table 37 presents summary information from the 84 schools providing numerical data, as well as comparative information for the 1949-1950 year as presented in the 50th Annual Report.[15] Since it is generally thought that World War II occasioned an increase in marriage of medical students, it is regrettable that a survey of the marital status of students was not reported during any year prior to 1950.

TABLE 34.—*Medical School Graduates in the United States and Canada by Sex, 1958-1959*

United States	Men	Women	Total
Medical College of Alabama	62	2	64
University of Arkansas	64	5	69
College of Medical Evangelists	78	3	81
University of California, Los Angeles	43	3	46
University of Southern California	63	3	66
Stanford University	54	3	57
University of California, San Francisco	70	10	80
University of Colorado	73	8	81
Yale University	74	5	79
Georgetown University	88	5	93
George Washington University	88	3	91
Howard University	68	7	75
University of Miami	54	5	59
Emory University	64	1	65
Medical College of Georgia	85	3	88
Chicago Medical School	68	..	68
Northwestern University	124	9	133
Stritch School of Medicine	82	4	86
University of Chicago	60	9	69
University of Illinois	148	5	153
Indiana University	136	4	140
State University of Iowa	97	3	100
University of Kansas	97	4	101
University of Louisville	84	2	86
Louisiana State University	108	2	110
Tulane University	114	4	118
Johns Hopkins University	65	3	68
University of Maryland	82	1	83
Boston University	59	7	66
Harvard Medical School	139	8	147
Tufts University	101	3	104
University of Michigan	179	7	186
Wayne State University	64	2	66
University of Minnesota	108	5	113
University of Mississippi	61	1	62
University of Missouri	31	..	31
Saint Louis University	115	1	116
Washington University	83	5	88
Creighton University	68	2	70
University of Nebraska	69	3	72
Albany Medical College	50	1	51
University of Buffalo	67	3	70
Albert Einstein College of Medicine	47	3	50
Columbia University	109	8	117
Cornell University	76	6	82
New York Medical College	113	10	123
New York University	120	12	132
State University of New York, Downstate Medical Center, New York City	127	11	138
University of Rochester	62	1	63
State University of New York, Upstate Medical Center, Syracuse	61	4	65
University of North Carolina	57	2	59
Duke University	75	3	78
Bowman Gray School of Medicine	45	2	47
University of Cincinnati	75	4	79
Western Reserve University	66	6	72
Ohio State University	135	5	140
University of Oklahoma	87	6	93
University of Oregon	66	..	66
Hahnemann Medical College	89	4	93
Jefferson Medical College	106	..	106
Temple University	109	6	115
University of Pennsylvania	123	2	125
Woman's Medical College of Pennsylvania	...	41	41
University of Pittsburgh	78	2	80
University of Puerto Rico	38	5	43
Medical College of South Carolina	70	4	74
University of Tennessee	163	10	173
Meharry Medical College	61	6	67
Vanderbilt University	47	1	48
University of Texas, Southwestern	84	7	91
University of Texas, Medical Branch	125	7	132
Baylor University	69	4	73
University of Utah	48	..	48
University of Vermont	36	4	40
University of Virginia	64	4	68
Medical College of Virginia	88	6	94
University of Washington	65	3	68
University of Wisconsin	68	3	71
Marquette University	91	4	95
Totals	6,490	370	6,860
Canada			
University of Alberta	49	1	50
University of British Columbia	40	4	44
University of Manitoba	52	3	55
Dalhousie University	49	3	52
Queen's University	54	2	56
University of Ottawa	53	2	55
University of Western Ontario	46	5	51
University of Toronto	138	9	147
McGill University	92	6	98
University of Montreal	91	6	97
Laval University	118	6	124
University of Saskatchewan	26	4	30
Totals	808	51	859

It appears that there is little significant change in the total proportions of married students by class since the 1949-1950 year with the exception of a 5% diminution in fourth-year married students in 1958-1959 as compared to nine years previously.

TABLE 35.—*Estimates of Median Minimum Expenses for First-Year Medical Students in United States**

Item	Private Schools (N-45)	Public Schools (N-41)	
		Resident	Nonresident
Tuition and fees	$1,050	$498	$830†
Room and board	800	700	700
Books and supplies (not including microscopes)	150	125	125

* Reprinted from "Admission Requirements of American Medical Colleges (including Canada), 1959-1960", for applicants to the 1960-1961 class, published by the Association of American Medical Colleges, Evanston, Ill., including a newly forming University of Kentucky School of Medicine, Lexington, because it will accept students for classes beginning September, 1960.

† Excluding two schools that accept no nonresidents in the first-year class and two schools that accept no nonresidents at all. Two private schools cite higher tuition for nonresidents.

About one-fourth of students in the first or entering class are married. This increases to more than one-half of the fourth-year students being married. The ranges are wide among students bodies in the various schools, as shown in table 37.

Table 38 compares the first-year and fourth-year classes as to proportions of students married. It clearly portrays the increasing proportions of married students by the fourth year. Whereas no school reported having more than 75% of first-year students married, 10 schools reported that high a proportion of fourth-year students married. For fourth-year students, only two schools (Woman's and Puerto Rico) could report less than 30% of the class as married, and 61 schools in all reported more than one-half of the senior class as married. Of the total of 11,945 married students, 200 are known to be married to other medical students.

Study of table 38 reveals an interesting difference in the marital status of students in publicly owned as compared to those in privately owned schools, both for first-year and fourth-year students.

TABLE 36.—*Estimates of Median Minimum Expenses for First-Year Medical Students (Canadian Dollars)**

First-year-Expense Item	Median Amount Cited by Medical Schools of Canada
Tuition and fees (resident)	$545.00
Room and board (minimum)	612.50
Books and supplies (not including microscopes)	105.00

* Reprinted from "Admission Requirements of American Medical Colleges (including Canada), 1959-1960," for applicants to the 1960-1961 class, published by Association of American Medical Colleges, Evanston, Ill.

Higher proportions of students in publicly owned schools are married than is the case in the privately owned medical schools. Of 4,035 first year students enrolled in 44 privately owned medical schools, 866 or 21.5% are married, as compared to 1,275 or 32.2% of the 3,961 first year students married in the 45 publicly owned schools. For fourth-year students, of 3,566 enrolled in 44 privately owned schools, 1,836 or 51.5% are married, while 1,953 or 61.5% of 3,175 students are married in the publicly owned medical schools. As table 38 shows, though 37 of the 44 privately owned schools which reported on marital status had first year classes in

TABLE 37.—*Marital Status of Medical Students*

Year	Total Enrollment	Number Married	% Married 1958-1959	Range in % of Classes	% Married 1949-1950*
		U.S.A.			
First	7,999	2,141	26.8	1.8-56.1	24.7
Second	7,302‡	2,662	36.5	5.7-72.7	35.6
Third	7,049‡	3,353	47.6	9.7-73.9	46.9
Fourth	6,741‡	3,789	56.2	17.1-88.3	61.2
		Canada			
First	772‡	60	7.8	1.4-20	
Second	703‡	102	14.5	2.3-30	
Third	678‡	126	18.7	7.3-31.4	
Fourth	701‡	219	31.1	14.2-53.7	

† Corrected by deleting enrollments in one school not reporting on marital status.

* From 50th Annual Report on Medical Education in U. S. and Canada, J. A. M. A. 144:118-119 (Sept. 9) 1950.

‡ Corrected by deleting enrollments in two Canadian schools not reporting on marital status.

which less than 31% of the students were married, only 19 of the 40 publicly owned schools had first year classes with that small a proportion of married students. On the basis of available information, one may only speculate on the causes of this difference.

Of the 12 Canadian medical schools, 10 supplied information about the number of married students. In each medical year, a materially smaller proportion of students in Canadian schools than in United States schools are married. Table 37 presents the information in summary form about the students in Canadian medical schools. Fewer than one-tenth of first-year students are married and by the fourth year, less than one-third of the students have married. The ranges in the 10 Canadian schools are also less wide than in the case in the United States medical schools. For first-year students, one school reported 30% of the class married, and four additional

TABLE 38.—*Comparison of Proportions of Classes Married,* First and Fourth Years, 1958-1959*

15% or less married	16-30%	31-50%	51-75%	over 75%
		First-Year Students		
12 schools	44 schools	25 schools	3 schools	None
10 Privately owned	27 Privately owned	5 Privately owned	2 Privately owned	
2 Publicly owned	17 Publicly owned	20 Publicly owned	1 Publicly owned	
		Fourth-Year Students		
None	2 schools	21 schools	51 schools	10 schools
	1 Privately owned	17 Privately owned	28 Privately owned	3 Privately owned
	1 Publicly owned	4 Publicly owned	28 Publicly owned	7 Publicly owned

* Corrected by deleting one school not reporting on marital status.

schools reported 20% or more of the class as married. Only two Canadian schools reported 50% or more of fourth-year classes married, and three additional schools reported 40% or more of fourth-year students married. By the time they had reached their fourth year, married students in only two schools

comprised less than 20% of the class. Of the 507 married students, only 12 were known to married to other medical students.

STUDENT HOUSING

Information regarding student housing under medical school control was requested from the medical schools this year. In response, it appears that 45 of the 85 schools in the United States have no such apartments or dormitories for medical students. Of the 40 responding in some degree affirmatively, 38 definitely have some housing under medical school (32) or university (6) control, and 2 replies stated "housing facilities available" without clearly indicating the nature of the control.

Five schools can accommodate 100% of the total medical student body in such apartments or dormitories (Arkansas, Yale, Minnesota, Missouri, and Cornell). Five other schools have 82 to 96% of their medical student classes in university or medical school housing (Indiana, Iowa, Johns Hopkins, Columbia, and South Carolina). Eight schools provided housing for 3.1 to 15.2% of their medical students, 9 schools provided for 16.2 to 29.9%, 8 schools for 31 to 46.2% of their students, and 5 schools provided housing for 52 to 71.5% of their medical students.

Of the schools providing housing, the median proportion of the student body accommodated in 1958-1959 was 36% and the average was 45%. The range was 3.1 to 100%. Three schools reported more students housed than they reported as total medical students, indicating that other students than medical students were reported occupying university or medical school controlled housing. In computing the average, these three were considered as 100%.

Eighteen of the 40 schools providing housing in 1958-1959 had single men, single women, and married students in the units. Seven schools had only single men so housed, eight schools had only single men and single women in their housing, one school had only married students in medical school controlled living units, and the remainder had various other combinations of single and married students.

Of the schools reporting medical students housed in medical school or university controlled housing, 29 schools reported without special qualification the yearly rental per student per year for men, 22 schools for rental to women, and 16 schools rental to married students. The average minimum rental per man per year was $322.11, and the median was $269. For women, the minimum average of the 22 schools was $387.84 and the median was $324.50. For married students with 16 schools reporting without incomparable qualification, the minimum average yearly rental was $633.48; the median was $653.75. The average and median rental figures for married students should engender some reservation; however, inasmuch as it is possible that some of the schools may have reported rentals per couple rather than per student. However, the rental ranges were great, as follows: for single men, $140 to $840 a year; for single women, $140 to $900; and for married students, $171 to $1,050 per student.

REPORTS OF CURRENT INTEREST TO MEDICAL EDUCATION

SECOND WORLD CONFERENCE ON MEDICAL EDUCATION

The Second World Conference on Medical Education in Chicago, Aug. 30-Sept. 4, 1959, attracted 610 registrants from 66 countries to hear 48 participants from throughout the world. The Conference was sponsored by the World Medical Association in collaboration with the World Health Organization, the Council for International Organizations of Medical Sciences, and the International Association of Universities, assisted by the American Medical Association and the Association of American Medical Colleges. Its theme was medicine—a lifelong study.

Dr. Raymond B. Allen was president of the Conference, Dr. Ray F. Farquharson of Canada and Dr. Victor Johnson were deputy presidents. Rapporteurs were Dr. F. Hugh Luckey, Dr. Thomas B. Turner, Dr. Oliver Cope, and Dr. Stanley S. B. Gilder, Canada.

In all sessions there was simultaneous translation of the discussions into French, Spanish, and English.

Viewpoints were exchanged regarding the activities and challenges in various countries about the four major subject areas of the Conference: (1) basic clinical training for all doctors, (2) advancing training for general and specialty practice, (3) the development of teachers and investigators, and (4) continuing medical education. An initial plenary session was followed by simultaneous sessions on these subjects during two half days, and one whole day with a summary plenary session. Included also in the overall program were technical and scientific exhibits of interest to the international assembly of medical educators, as well as opportunities to visit medical institutions in Chicago or review medical motion pictures and television programs.

The papers presented and the discussion will be published as proceedings in book form by the World Medical Association, 10 Columbus Circle, New York City 19. Papers presented to the initial plenary session August 31 were published in THE JOURNAL.[17]

The American Medical Education Foundation

On Feb. 9, 1959, the American Medical Education Foundation made grants from the 1958 income of $1,133,258 to the eighty-five medical schools in the United States. Of these contributions, $627,958 were in the form of earmarked gifts from physicians to specified schools. The balance was distributed

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equally. This brought the total that the Foundation has raised and distributed from the medical profession to $7,874,723 since 1951.

The American Medical Education Foundation, sponsored by the American Medical Association, which pays all of the cost of AMEF's administration and promotion, has developed a deep interest for the financial problems of medical education in most of the state and county societies across the country. A corollary interest in the educational problems of these schools has also been developed while presenting the schools' monetary needs.

The activities of the Foundation, in its effort to stimulate giving, have been brought to the attention of the entire profession. Editorials have been printed in every medical journal in the United States. Advertisements have been run in a great number of these journals. Exhibits have been displayed at many state and national medical meetings. The officers and the staff of the Foundation have spoken in general meetings and to the Houses of Delegates of a large majority of the societies. The state chairmen and committeemen have presented the urgent needs of the schools to county meetings and in reports to state societies.

The national office has sent two or three mailings a year to the entire profession and distributed brochures and promotional material to the state societies, who, in turn, have made many mailings themselves. With the help of the Foundation staff and the executive staffs of the state associations, highly organized solicitation campaigns have been conducted in many states. Six states now have a compulsory item on their dues bill for the American Medical Education Foundation. Six others include this as a voluntary item on their dues statement. Surprisingly, the physicians in these states that use the dues statement method are at least as enthusiastic about the program as those that go to the great efforts of voluntary campaigning.

During the past three years the Foundation has also worked out coordinated programs of various natures with several of the medical schools themselves. Particularly successful in this has been the Georgetown-AMEF joint appeal.

On many of the state campaign committees, and on some of the local campaign committees, representatives from the medical schools, such as deans, assistant deans, or faculty members have been asked to serve. This has resulted in greater cooperation and understanding between the societies and the schools. One outstanding example of this has been in a city in the south where some misunderstandings were resolved in the joint efforts put forth by all for the AMEF program.

The Foundation has also assisted the schools by collecting and tabulating the results of the appeals to physicians from the schools themselves. Last year $3,034,406 in contributions from 55,246 physicians were recorded in the Foundation office. An important policy of the Foundation—the emphasis on unrestricted gifts—has been adopted as a responsibility which the Foundation has continued to publicize.

It is hoped that the Foundation's continued insistence on unrestricted gifts will assist the schools in securing similar releases from other sources of support.

The Foundation's grants are made without stipulation, or rather, it is stipulated that they are to be used as the dean and the medical school administration feel they are most needed. In addition, it is emphasized that the grants are extra budgetary in nature and are to be considered as support for programs where no other moneys are available, or as an increment to inadequate appropriations from basic sources.

NATIONAL FUND FOR MEDICAL EDUCATION

The accompanying résumé has been submitted by the staff of the National Fund for Medical Education to acquaint readers with the current activities of the Fund in support of medical education.

The National Fund for Medical Education in March, 1959, awarded grants totaling $2,925,180 to the nation's 82 accredited medical schools. This brought to $18,743,946 the total distributed by the Fund since its first grants were made in 1951.

Each four-year school received $15,000 plus $60 per undergraduate medical student. The four two-year medical schools of the basic medical sciences received $7,500 each, plus $60 per student.

In addition, in May, the Fund made grants totaling $75,000 to 11 medical schools, under its special Class C Grants Program, to help American educators find ways to cope with teaching problems growing out of the rapid advancement of the medical sciences. These grants ranged in size from $360 to $14,000 and were given on a one-year basis.

The Fund's grants were made possible through the generosity of some 1,946 corporations, which contributed $2,046,399, as well as through a Ford Foundation grant of $1,027,705, under its "matching" arrangement with the Fund.

In July, 1958, the Fund established its Medical Research Program through which contributions from united funds, community chests, voluntary health agencies, and other programs would be channeled into basic medical research. The program will aim to help support the continuing search for new medical knowledge and to increase the number of trained medical researchers in the U. S. by stimulating interest in basic research. Many local community chests and united funds are supporting the Medical Research Program.

This expansion of the Fund's program will in no way affect its present campaign among corporations to obtain support for the teaching budgets

of the medical schools. The first grants under the Medical Research Program will be made in the winter of 1960 to the 85 medical schools.

In September, 1959, the Fund joined with the American Medical Association and the Association of American Medical Colleges in presenting the seventh Frank H. Lahey Memorial Award to Devereux C. Josephs, former Chairman of the Board, New York Life Insurance Company, and Chairman of the Fund's Grants Review Board. This award is given annually to a layman for "distinguished service to medical education." Previous recipients have been President Dwight D. Eisenhower, former President Herbert Hoover, Dr. Abraham Flexner, Colby M. Chester, Alfred P. Sloan Jr., and Frank Abrams.

The Fund is continuing its campaign to alert American corporations to the problems and needs of medical education. Over the years its experience has demonstrated that American management is increasingly recognizing its responsibility to help create a healthy, strong and resourceful nation. Corporation directors, the Fund feels certain, are becoming more and more aware that medical education is a focal point of national strength and they are ready, we believe, and willing to take their place in the ranks of those supporting medical education if the facts can be brought to their attention in the proper fashion. That has been the Fund's job and will continue to be its job in 1960.

NATIONAL INSTITUTES OF HEALTH STUDY OF TWENTY MEDICAL SCHOOLS

On November 1, 1958, Dr. James A. Shannon, Director of the National Institutes of Health, appointed a Staff Committee on Support for Medical Research and Training to evaluate the impact of research growth on medical schools and to make recommendations for measures that NIH might undertake "to facilitate the present conduct and further development of medical research at schools of medicine." The Committee, chaired by Dr. Kenneth M. Endicott, Associate Director, NIH, reported in April, 1959, after a three month full time period of collecting and analyzing the data. Questionnaires and visits to the 11 publicly owned and 9 privately owned schools provided the data.

Comparative data for 1948 were obtained from the Surgeon General's Committee on Medical School Grants and Finances, 1949. The schools projected estimates for 1970.

It is believed that the 20 schools selected were, as nearly as possible, a representative group.

The study outline covered the following areas:

1. Developments over the past decade: (*a*) changes in the school's sources of income and pattern of expenditure; (*b*) changes in faculty and staff; (*c*) changes in enrollment levels; and (*d*) construction of new facilities.

2. An appraisal of current NIH mechanisms for support of research and training, their strengths and weaknesses, and discussion of whether changes in policy and procedure should be considered.

3. A consideration of medical school views regarding the major recommendations of the Bayne-Jones report.

4. A projection of future developments at each school on the assumption that financial support would increase.

General trends shown were that during the past decade, schools have grown rapidly in response to demands. Full-time faculty have doubled, expenditures have tripled, and $130,000,000 was spent on construction. By 1970, if funds are available, these trends will continue. Full-time faculty personnel will increase by almost two-thirds, expenditures will double, and $420,000,000 will be spent on construction. It was reported that most of the growth has been related to increased emphasis on research, to the increasing complexity of medical education, and to the schools' expanding role in the training of personnel for research, for clinical specialties, and for professions allied to medicine.

As to medical student graduating classes, it was estimated that these might be increased by one-third if additional two-year schools of basic medical sciences were created, but that the present schools could accommodate no more than a 21% increase in entering medical students. The 20 schools in the study need and will continue to need third year medical student transfers of about 10% the size of their entering classes. If all 85 schools increased their first year enrollment by 21% during the next decade, based on the current entering class of 8,128, 9,636 students could be admitted. If increased funds permitted both an increase in size of entering classes as estimated, and two-year schools added 788 students to third year classes in the 81 schools, then 9,148 total students could be graduated. It is estimated that in five years there would be an expansion also of 50% in medical student research trainees, 49% in graduate and postdoctoral nonclinical programs, 21% in students in allied or paramedical areas, 86% in clinical fellows and trainees, and 34% in students in other clinical education including continuation courses.

The importance of federal research and training grants in medical school expenditures was evident. In 1948, such federal support comprised 9% of total budgets. This increased to 29% in 1958 and it was estimated it will be 44% of total medical school expenditures by 1970. The surveyed schools had received about $25,000,000 in federal construction grants and estimated the need for more than $130,000,000 in federal construction grants for the period 1958-1970.

The study revealed that separately budgeted research in 1958 comprised 42% of medical school budgets as compared to 22% in 1948. The Commit-

tee's estimate of the total cost of research in nine public and seven private medical schools studied was $34,100,000, of which the gifts, grants and contracts provided only $23,900,000, with $10,200,000 coming from the medical school institutional funds. Thus, because the gifts and grants seldom paid the full cost of the particular project for which they were awarded and because such funds made up an increasingly large segment of medical school expenditures, one result was that the schools had proportionately less and less fluid money. The schools studied emphasized their need for fluid funds.

Another impact of the research and training grants was on faculties. There is an increasing proportion of non-tenure faculty members supported by grants who are denied permanent appointments because the schools have not in sight requisite state appropriations or endowment income. Lack of permanent faculty appointments denies the grant-supported personnel a number of tangible and intangible benefits. If research is to attract and hold outstanding people, the Committee stated that this situation must be overcome. The study noted that 36% of the paid, full-time faculty of the schools studied received all or part of their salaries from gifts, grants, and contracts.

The Staff Committee recommended that the Public Health Service, an agency which is intimately involved and deeply concerned and in a position to provide leadership to rally support for the schools from other groups, take the following steps:

1. Modify and expand existing programs that aid in construction of medical school facilities;
2. Establish a new program of institutional research grants to improve and stabilize the rapidly growing research programs by providing fluid funds that schools will feel justified in using to underwrite permanent appointments for research staff;
3. Provide for payment of the full costs of research;
4. Extend the senior research fellowship program to meet urgent needs in clinical as well as in preclinical areas;
5. Expand research grant and training programs.

In addition, the Staff Committee recommended for less immediate implementation, a study of the needs of medical schools for general operating funds and the needs of medical students for some form of financial assistance, as well as consideration of the possible value of initiating a series of national conferences on medical research and medical education.

THE SURGEON GENERAL'S CONSULTANT GROUP ON MEDICAL EDUCATION

Late in 1958, the Surgeon General of the Public Health Service established a Consultant Group on Medical Education. The group of more than twenty prominent and knowledgeable individuals were requested to consider the question: "How shall the nation be supplied with adequate numbers of well-qualified physicians?" The study with accompanying recommendations is expected to be published shortly. The findings of this deliberative body should prove to be of great value to those individuals and organizations interested in and concerned with future medical manpower needs.

INTERNATIONAL EDUCATIONAL EXCHANGE IN MEDICINE

The annual issue of "Open Doors," [18] published in May, 1959, by the Institute of International Education presents a valuable and detailed report on the international exchange of students, faculty members, and physicians between the United States and other countries. The Institute annually conducts five surveys which form the basis for its yearly report. According to the Institute's current surveys, there are more foreign citizens in the United States for educational purposes than ever before. The following is quoted from the introductory paragraphs of the 1959 report.

> There were 57,574 foreign citizens on educational assignment in the United States during the academic year 1958-1959. This represents a 10% increase over 1957-1958, when 52,355 foreign citizens were reported. 47,245 of this year's foreign citizens were students; 1,937 were foreign lecturers, professors or researchers who had received appointments to American faculties and 8,392 were foreign interns and residents affiliated with hospitals in the United States.
>
> The foreign nationals included in Open Doors are citizens of other countries who have come to the United States for educational purposes and who intend to return home upon the completion of their assignment. Displaced persons who are settling in the United States and foreign citizens who are establishing permanent residence in the United States are not included.
>
> These visitors represent every major geographical and political area. As in previous years, the largest number of exchangees came from the Far East and the second largest number from Latin America. The 19,431 nationals from Far Eastern countries were 33.7% of the entire foreign population, and the 12,111 from Latin America represented 21%. 9,025 students, physicians and faculty members came from Europe; 8,082 from the Near and Middle East, and 6,177 from North America (Bermuda and Canada). Even though more citizens of the countries of Africa and Oceania are in the United States this year than last, they still constitute a small proportion of the exchangees.
>
> The total number of U. S. citizens reported—faculty members for 1958-1959 and students in 1957-1958—showed a 17% decrease from last year's published figure of 14,534 U. S. citizens abroad for educational purposes. The majority of American scholars went, as in previous years, to Europe. Fewer Americans were reported in Latin America, Canada and the Far East, but in spite of the over-all decrease there was an increase in the number of Americans in the Near and Middle East and Oceania.

Of particular interest are the approximately 645 foreign students enrolled in premedical studies, 1,154 in medicine (undergraduate and graduate but excluding internship and residency) and 1,742 enrolled as undergraduate or graduate students in the general field of biological sciences.

Visiting Foreign Scholars on Faculties of United States Educational Institutions

The Institute reported that during the 1958-1959 academic year there were, for the first time since its surveys were initiated, more foreign professors, instructors, lecturers, and advanced research scholars on the faculties of United States colleges and universities than there were United States faculty members abroad. There were 1,937 foreign faculty members reported on United States faculties and only 1,842 United States faculty members reported abroad. Last year there were 1,342 visiting foreign scholars at 222 United States colleges and universities. This year, 288 institutions welcomed 1,937 faculty members to their campuses. The scholars in the United States represented 71 countries.

The largest group of visiting foreign faculty members, 907, were in the natural and physical sciences; 286 scholars served on medical faculties; 270 in the various fields of the humanities; 179 in the social sciences; 177 in engineering; 44 in agriculture; 42 in education; and 32 in business administration.

TABLE 39.—*Foreign Students in Medical Schools in the United States, 1958-1959*

Area	Countries, No.	Students, No.
Far East	12	98
Near and Middle East	9	53
Europe	12	70
Latin America		
Caribbean	9	58
Central America	6	20
South America	8	28
Africa	7	22
Oceania	2	2
Total	65	346

Foreign Students Studying Medicine in the United States and Canada, 1958-1959

In 1958-1959, there were a total of 346 foreign students enrolled in United States medical schools (table 39). These students represented 65 different countries and are studying medicine in 63 of the 85 United States schools. Included in this total of 346 are 110 foreign students who were admitted to the entering class of 47 schools. In addition, 86 students were enrolled in the second year, 80 in the third year, and 70 in the fourth year. Table 40 gives, for five academic sessions, the number of students from foreign countries admitted to medical schools in the United States as entering students to the first year class.

TABLE 40.—*Foreign Citizens Enrolled in Entering Class of Medical Schools of United States, 1954-1959*

School Year	No. Foreign Students in Entering Class
1954-1955	94
1955-1956	97
1956-1957	92
1957-1958	73
1958-1959	110

The 12 medical schools in Canada enrolled 86 foreign students from 21 countries and 219 citizens of the United States, a total of 305 students. The areas represented and the number of students from each area are included in table 41.

TABLE 41.—*Foreign Students in Medical Schools in Canada, 1958-1959*

Area	Countries, No.	Students, No.
Far East	4	35
Near and Middle East	3	3
Europe	6	12
Latin America		
Caribbean	2	3
Central America	2	2
South America	1	1
Africa	3	9
United States	..	219
Other*	..	21
Total	21	305

* Countries not specified

United States Citizens Studying Medicine Abroad

The Institute of International Education presents in its "Open Doors" the total number of the United States students studying but does not break the figure down into major fields of study. There appears to be no accurate calculation available of the number of students studying medicine abroad. It appears likely, however, when compared to the ratio of applicants to admissions in United States schools, that many of the American students now studying medicine abroad were not considered qualified for such study in United States schools.

It has been possible for the past several years to collect data pertaining to the numbers of American-born graduates of medical schools outside of the United States and Canada who have received their initial medical licenses in the United States. Table 42 records accumulated figures from 1950-1954 and yearly data for succeeding years. Such data were not available for New York, which licenses a good proportion of foreign physicians and Pennsylvania with a more normal complement prior to 1956. Beginning in 1956 when returns were available from all states, it will be noted that the figure is steadily increasing, showing an increase

TABLE 42.—*Initial United States Licenses Issued to American Graduates of Foreign (Excluding Canada) Medical Schools*

Year	No. of Licenses Issued	No. of States
1950-1954	99	20
1955	89	19
1956	163	15
1957	212	17
1958	284	26

of 72 in 1958 over the previous year. It can be predicted that this figure will increase as the students abroad complete their training and return to the United States.

Foreign Physicians Training in United States Hospitals

In terms of numbers of students involved, the greatest contribution by American medicine to the medical education of foreign physicians continues to be at the graduate level. The Institute of International Education's survey of foreign physicians training in United States hospitals, as reported in "Open Doors," is as follows:

During the 1958-1959 academic year, 8,392 physicians from 91 countries trained in United States hospitals. 6,068 trained as resident physicians and 2,324 as interns. These figures represent an increase of 770 physicians over the 7,622 reported last year. 3,109 physicians were in the United States from the Far East, 1,737 from Latin America, 1,331 from the Near and Middle East and 1,480 from Europe.

Most foreign areas showed an increase in the number of physicians reported. The number of physicians from the Near and Middle East increased approximately 25%. An increase of 19% was reported from the Far East; 493 more physicians were in the United States from this area. Of this the Philippines alone accounted for an increase of 384 men and women in medicine. The number of physicians from Europe decreased. 153 or 9% fewer doctors from European countries were reported at United States hospitals this year. [Table 43.]

Foreign physicians trained in 40 states, the District of Columbia, Hawaii, and Puerto Rico. 27% of all foreign physicians were located in New York. There is such a wide distribution of foreign physicians throughout the United States that only 10 institutions reported more than 50 foreign physicians. These 10 hospitals only accommodate slightly more than 7% of the total number of foreign physicians. [Table 44.]

United States Faculty Members Abroad

During the 1958-1959 academic year, 1,842 faculty members from 367 United States colleges and universities were on teaching or research assign-

TABLE 43.—*Leading Nationality Groups of Foreign Physicians in the United States*

Nationality Group	No. of Physicians
Philippine Islands	1,982
Turkey	650
Canada	563
Mexico	512
Iran	402
Korea	304
Greece	296
Japan	287
India	279
Germany	269

ments in 82 foreign countries. Of these, 124 were members of medical faculties. On this aspect of its studies, the Institute of International Education points out that the United Kingdom received the largest percentage of American scholars, 17% of all faculty members abroad were in the United Kingdom. France was second with 132, or 7%, of the American scholars. As in previous years, the humanities, the social sciences, and the natural and physical sciences are the leading fields. Education, medicine, agriculture, engineering, and business administration follow in that order. The number of scholars in the natural and physical sciences and in medicine showed a sharp increase, while the fields of education, agriculture, and engineering showed a sharp decrease. There were 389 scholars reported in the natural and physical sciences as compared to 272 last year. Medical faculty members increased from 107 to 124.

TABLE 44.—*Ten Hospitals with More than Fifty Foreign Physicians*

Hospital	No.
Bellevue Hospital Center, New York	91
Memorial Center for Cancer and Allied Diseases, New York	80
Cumberland Hospital, Brooklyn, New York	68
Kings County Medical Center, Brooklyn, New York	67
Elmhurst General Hospital, Elmhurst, New York	66
Jersey City Medical Center, Jersey City, N. J.	56
Henry Ford Hospital, Detroit, Michigan	55
Lincoln Hospital, New York	54
Cuyahoga County Hospital, Cleveland, Ohio	51
Peter Bent Brigham Hospital, Boston, Mass.	51

AREAS ALLIED TO MEDICINE

SCHOOLS FOR MEDICAL RECORD LIBRARIANS

The Council has worked closely with the American Association of Medical Record Librarians since 1942 in the development of criteria for and evaluation of educational programs in medical record library science. Initial and continued approvals of schools are considered by the Council on the basis of the recommendations of the Education and Registration Committee of the American Association of Medical Record Librarians, which has an able education director who makes periodic survey-visits to schools.

Significant studies to further advance training in the field have been carried out by the American Association of Medical Record Librarians.

Revision of the curriculum currently recommended by the Council and the American Association of Medical Record Librarians is under active consideration. Revisions which are expected to be adopted in 1959-1960 will be gradually implemented over a period of several years.

As of June 30, 1959, there were 30 approved schools. Student enrollment increased in 1958 to 169 students in the senior class of degree programs and in certificate programs, which represents a 1% increase over 1957. There was a training capacity for 246 students in these programs. Accordingly, the occupancy rate was 42% for the senior class of 9 degree programs with senior students in 1958 and 83% in the 21 active certificate programs. Since no students were enrolled in one school offering only a degree program but students were separately en-

rolled in both programs offered by one school, students were enrolled in 30 programs offered by 29 schools. The number of graduates in 1958 for 10 degree programs was 18. In addition, there were 79 graduates from 21 certificate programs or a total of 97 graduates from 26 schools in 1958. In 1957, 26 degree and certificate programs graduated 139 medical record librarians. Since June 1959, three educational programs have been discontinued and two have been inactivated for the academic years 1959-1961. Approvals for two new university programs in medical record science are pending.

Approved schools offer curricula which include theoretical instruction and practical training in hospitals. When the hospital training is sequentially and properly integrated with collegiate studies, a degree is available after four years of study. As of June 30, 1958, among the 10 schools offering degree programs, 7 admit qualified high school graduates, and 3 schools require three years of preparatory college. In the 21 schools offering certificate programs of one year's duration, 17 require two years of college prior to admission. All but 3 of these 17 schools will also admit graduates from an accredited school of professional nursing of at least three years' duration. A college degree is required for admission into 4 certificate programs. Lists of approved schools are available from the Council. Applicants should write directly to the Medical Record Librarian-Director of the School.

Schools conducting degree programs usually begin in June, and the majority of certificate programs admit students in September. Tuition ranges from $125 to several hundreds of dollars per year and 2 schools require none. A hospital or university should apply to the Council on Medical Education and Hospitals of the American Medical Association for approval.

SCHOOLS FOR MEDICAL RECORD TECHNICIANS

Schools for medical record technicians are conducted to train the medical record technician who, working under the supervision of a qualified medical record librarian or a medical record committee, performs the technical tasks associated with the maintenance and custody of medical records.

As in the case of medical record librarians, the Council has developed educational criteria for and evaluates schools in close collaboration with the American Association of Medical Record Librarians.

The training of medical record technicians should be conducted in acceptable general hospitals having a minimum of 4,000 admissions. These admissions should include an adequate distribution of patients in the various clinical services commonly found in general hospitals. Candidates for admission to an approved school should be proficient in typing and preferably also in shorthand. They should have completed the requirements for high school graduation or should have passed a college entrance examination for admission to an accredited college or university. The minimum length of training is nine months and should include theoretical instruction in anatomy, medical terminology and medical records, with additional practical training in admitting and discharge procedures, indexing, preparation of reports, and other activities associated with the medical record department.

There are 12 hospitals approved by the Council for training medical record technicians. These schools reported a training capacity for 78 students with an enrollment of 55 students and 40 graduates in 1958. Data for 1957 are 11 schools with a training capacity for 73 students, an enrollment of 58 and 37 graduates. Qualified high school graduates are accepted for courses of from 9-12 months duration.

Hospitals should apply to the Council on Medical Education and Hospitals for approval. Special forms will be supplied for this purpose, and, when the required information has been received, the proposed training program will be reviewed in collaboration with the Committee on Education and Registration of the American Association of Medical Record Librarians. The institutions applying for Council approval will, in all instances, receive full information and every possible assistance in the planning and development of training programs in accordance with present standards. There continues to be an acute shortage of qualified medical record librarians and medical record technicians. Excellent opportunities exist for graduating students. Inquiries on career opportunities, registration, and accreditation of qualified medical record personnel should be addressed to the American Association of Medical Record Librarians, 840 North Lake Shore Drive, Chicago 11.

SCHOOLS FOR MEDICAL TECHNOLOGISTS

In its continuing efforts to assist hospitals in the development of training programs for medical technologists, the Council cooperates closely with the American Society of Clinical Pathologists, the Board of Schools of Medical Technology, the Board of Registry of the Society, and the American Society of Medical Technologists. The Board of Schools was established by the society in 1949 to serve as the major advisory body to the Council in all matters relating to standards and the evaluation of educational programs. Revisions of the standards occurred in 1941, 1943, 1947, 1949, 1953, and June, 1958. The significant revision is that, effective Jan. 1, 1962, entrance requirements will be increased from two to three years of pretechnical collegiate education. No major change has been made in the 12 months' technical curriculum in the hospital. It is expected that the third year of college will provide emphasis on general education yet also afford, in appropriate balance, selected courses to broaden the students' science background. Schools not currently affiliated with colleges and universities are en-

couraged to consider affiliation or affiliations whereby a consecutive educational sequence of three years of college and one year of hospital training will lead to a baccalaureate degree. While such affiliation is not required, it is encouraged on the basis of the inherent educational benefits to students and faculties and the favorable experience of currently affiliated hospital schools.

As of June 30, 1959, there were 702 approved schools, or an increase of 3% over the 681 schools approved in 1958. Enrollment increased 4% to 3,209 students in 1958 and the number of graduates was 2,345, which represents a 3% increase over 1957. With a student capacity of 5,345 the occupancy rate in 1958 was 60%.

Seventy-seven per cent, or 538 training programs, base admission on two years of college; 130 (18%) require three years of preclinical college education; and 34, or 5%, require a baccalaureate degree for admission.

The number of hospital schools with college or university affiliations continues to increase. In 1958, a total of 503 hospital schools (72%) had college or university affiliations. Such affiliations as noted above are strongly encouraged since they stimulate the development of well-organized training programs suitably integrated with the college curriculum and also serve as a continuing source of students. If properly integrated, a degree is available upon completion of three years of college education followed by one year of hospital training in 474 (68%) of the 702 approved schools. Active liaison between the hospital and the affiliated college is strongly recommended through regularly scheduled meetings of an advisory or coordinating committee comprised of representatives from each faculty.

The minimum duration of the hospital course acceptable for approval is 12 months. Ninety-one per cent, or 636 schools, offer a course of 12 months' duration. The remaining 9% of the programs vary from 12½ to 36 months in length. Tuition is required by 139 (20%) and a minimal breakage fee by 77, or less than 11%, of the schools. Students receive a stipend in 400 (57%). All states except Alaska, the District of Columbia, the Canal Zone, and Puerto Rico have approved schools. Interested high school students should apply to accredited colleges and universities of their choice; those students in college or with collegiate backgrounds should apply to the pathologist-director of the laboratory school of their choice. Lists of approved schools of medical technology, which indicate those schools that have college affiliations, are available from the Council.

Application for approval of a school for the training of medical technologists should be made to the Council on Medical Education and Hospitals of the American Medical Association. Forms will be supplied for this purpose on request and should be completed by the director of the laboratory requesting this approval. Inquiries regarding the registration of qualified medical technologists should be addressed to the Board of Registry of Medical Technologists, P. O. Box 44, Muncie, Indiana.

SCHOOLS FOR OCCUPATIONAL THERAPISTS

Through a cooperative liaison which began in 1933 on the request of the American Occupational Therapy Association, the Council has developed standards for the education of occupational therapists. These were initially adopted by the House of Delegates in 1935, and subsequent revisions have been approved in 1938 and 1949. Recommendations for periodic revisions of standards and initial and continued approvals of curriculums are submitted to the Council by two advisory groups, the Council on Education of the American Occupational Therapy Association and the Advisory Committee on Occupational Therapy Education of the Council on Medical Education and Hospitals. The recently appointed advisory committee consists of nine physician members nominated by national organizations in the fields of chest diseases, general surgery, internal medicine, neurology, orthopedic surgery, pediatrics, physical medicine and rehabilitation, psychiatry, and medical education. In addition, there are three occupational therapist members nominated by the American Occupational Therapy Association and its Director of Education serves as a consultant. Surveys of schools are conducted by joint physician-therapist teams and submitted to the advisory groups which formulate recommendations for final action by the Council. An extensive Curriculum Study Project is being carried out by the American Occupational Therapy Association, to evaluate and further advance educational opportunities in the profession.

TABLE 45.—*American Occupational Therapy Association Statistics for Total Degree and Certificate Student Enrollment and Graduates for the Academic Years 1957-1958 and 1958-1959*

Year	Total Student Enrollment	Graduates*
1957-1958	4,266	561
1958-1959	3,913	581 (estimated)

* Calendar years 1958 and 1959.

As of June 30, 1959, there were 29 approved schools. Statistics for total degree and certificate student enrollment and graduates for the academic years 1956-1957, 1957-1958, and 1958-1959 based upon data submitted to the American Occupational Therapy Association are shown in table 45.

Training for an occupational therapist includes a good general collegiate education coordinated with the professional curriculum in occupational therapy and supervised clinical practice in hospitals. Certificate and degree recognition is available and those so recognized have equal professional status.

Programs leading to a baccalaureate degree are generally of four years' duration and schools offering this curriculum accept qualified high school students and transfer students. Certificate programs are predominantly 18 months in duration and accept students with a baccalaureate degree. However, since universities have individual policies on transfer students, interested undergraduates are encouraged to contact schools of their choice early in their collegiate careers to determine admission requirements for the certificate and/or degree programs in a given school. Tuition in all teaching centers closely parallels college fees. Most courses begin in September or February. Lists of approved schools are available from the Council.

Application by schools for approval of an educational program in occupational therapy should be made to the Council on Medical Education and Hospitals of the American Medical Association. Forms will be supplied for this purpose on request. They should be completed by the administrator of the institution requesting approval. Inquiries regarding career opportunities in the field of occupational therapy and the registration of qualified therapists should be addressed to the American Occupational Therapy Association, 250 West 57th Street, New York 19.

SCHOOLS FOR PHYSICAL THERAPISTS

On the request of the American Physical Therapy Association, the Council developed standards that were adopted by the House of Delegates in 1936. The Council, in cooperation with its advisory groups, the Council on Physical Medicine and Rehabilitation of the American Medical Association and the American Physical Therapy Association, has periodically submitted revised standards to the House of Delegates, which were adopted in 1943, 1949, and 1955. In 1955, the Council on Physical Medicine and Rehabilitation became the Council on Medical Physics, with which there continues close liaison on matters pertaining to physical therapy but which no longer functions in an advisory capacity on physical therapy education. Recommendations for periodic revisions of standards and on initial and continued approvals of curriculums are submitted to the Council by two advisory groups, the American Physical Therapy Association and the Advisory Committee on Physical Therapy Education of the Council on Medical Education and Hospitals. The Advisory Committee on Physical Therapy Education consists of nine physician members who are nominated by national organizations representing the fields of physical medicine and rehabilitation, orthopedic surgery, psychiatry and neurology, internal medicine, pediatrics, general surgery, and medical education. In addition, there are three members who are physical therapists, two nominated by the American Physical Therapy Association and one nominated by the American Registry of Physical Therapists. The educational consultant of the American Physical Therapy Association attends all meetings in this capacity. Surveys of new and existing schools are conducted by joint physician-therapist teams and recommendatory action submitted by the advisory groups to the Council for action. Active liaison with the medical directors, therapist educational administrators, and other members of the teaching faculties in approved schools is being implemented through more frequent periodic surveys.

As of June 30, 1959 there were 39 approved schools. On the basis of data reported to the American Physical Therapy Association, enrollment statistics for the senior class of degree programs and for the certificate programs and the number of graduates for 1957-1958 and 1958-1959 are shown in table 46.

Certificate and degree recognition in physical therapy is available and those so recognized have equal professional status. Most schools offer both degree and certificate programs and either or both recognitions are available depending upon a student's preparatory collegiate education. Certificate programs are usually 12 months in duration, and admit students with two or three years of college or those who have graduated from a nationally accredited school of professional nursing of at least three years' duration. The majority of degree programs are four years in length and admit qualified high school graduates and transfer students. Interested undergraduates are encouraged to contact the school of their choice early since admission and transfer requirements vary. Tuition varies in accord with university fees and the majority of courses begin in September or February. Lists of approved schools are available from the Council.

TABLE 46.—*American Physical Therapy Association Statistics for Degree and Certificate Enrollment and Graduates for the Academic Years 1957-1958 and 1958-1959*

Year and Class	Schools Reporting, No.	Senior (Degree) and Certificates Students Enrolled, No.	Total Graduates, No.
1957 Senior	14	798	750
1957 Certificate	30		
1958 Senior	31	676	718
1958 Certificate	27		

Application for approval should be made to the Council on Medical Education and Hospitals of the American Medical Association. Forms will be supplied for this purpose on request. They should be completed by the administrator of the institution requesting this approval. Inquiries regarding voluntary registration of qualified therapists should be addressed to the American Registry of Physical Therapists, 30 North Michigan Avenue, Chicago 2. Information on requirements for state registration or licensure is available from the Board of Examiners of the states concerned. Inquiries regarding careers

in the field of physical therapy should be addressed to the American Physical Therapy Association, 1790 Broadway, New York 19.

SCHOOLS FOR X-RAY TECHNICIANS

The Council has been ably assisted by the American College of Radiology, the American Registry of X-Ray Technicians, and the American Society of X-Ray Technicians in revising criteria for training and evaluating educational programs in x-ray technology. These advisory groups participated in the most recent revision of the standards adopted by the House of Delegates in December, 1955. An increase in duration of the educational program to a minimum of 24 months is currently under consideration to become effective in 1962.

Schools making application for approval are surveyed by state and regional councilors appointed by the American College of Radiology. Radiologists appointed by the College also periodically re-survey approved schools and these radiologists are currently revisiting approved schools. Their tremendous and voluntary contributions of time and experience are a major asset in the program. All data are evaluated by the Committee on Technician Affairs of the American College of Radiology and recommendations submitted to the Council for final action.

As of June 30, 1959, there were 609 schools approved by the Council for training x-ray technicians, which represents an increase of 9% over the 557 approved in 1958. Enrollment for 1958 increased 468 or 11%, to a total of 4,581 students. The training capacity increased 11% in 1958 over 1957 to a total of 5,358. The number of graduates increased 1% to a total of 2,129 in 1958.

The minimum admission requirement is high school graduation. A total of 589 schools (97%) admit students directly out of high school, 14 schools (2%) require one year of college, 5 schools, (1%) require two years of college, and one school accepts only registered nurses.

The length of training in 446 (73%) is 24 months, 12 months in 100 (17%), 18 months in 32 (5%) and varies from 13-48 months in 4%. Seven schools offer two courses of 12 or 24 months' duration. Tuition is required by 213 (35%) and 465 pay students a stipend. Collegiate affiliations have been established by 194 (32%) of approved schools. Students should apply directly to the radiologist-director of an approved school. Lists of approved schools are available from the Council on request.

Applications for approval of schools of x-ray technology should be submitted to the Council on Medical Education and Hospitals of the American Medical Association, 535 N. Dearborn Street, Chicago 10. Inquiries regarding registration of qualified x-ray technicians should be addressed to the American Registry of X-Ray Technicians, Metropolitan Building, Minneapolis 1, Minn.

NATIONAL ACADEMY OF SCIENCES–NATIONAL RESEARCH COUNCIL STUDY OF POSTDOCTORAL FELLOWSHIPS

Postdoctoral fellowships in the medical sciences form an important part of medical education. The Division of Medical Sciences of the National Academy of Sciences–National Research Council have completed a survey of such fellowship programs and their impact on medical education. Dr. Arthur S. Cain Jr., the director of this study, has provided an analysis of the final report of the survey for inclusion in this report on Medical Education in the United States and Canada.

A national survey of postdoctoral fellowships in the medical sciences has been completed by the Medical Fellowship Board of the National Academy of Sciences–National Research Council. The final report of the survey is in the process of preparation and should be available soon. The purpose was to study the impact of fellowships on medical education and research and especially to weigh the appropriateness of current fellowship programs against the implications of recent scientific developments and the needs of academic medicine. Conducted largely by questionnaire, the survey involved some 19,000 physicians and non-physicians who, as past, present, or potential fellows, faculty members and investigators, could provide the necessary information and opinions. Some preliminary information from the survey was included in "Medical Education in the United States and Canada 1957-1958." [19]

As a result of data and conclusions from the survey, the Medical Fellowship Board has recommended termination of its traditional program of National Research Council Fellowships in the Medical Sciences, a program with which it pioneered almost forty years ago. At the same time, based upon its appraisal of the influences now dominating medical education, the Board has proposed a new fellowship program, planned specifically in the interests of academic medicine.

That postdoctoral fellowships play an important role in the education of medical scientists is underlined by the fact that more than 4,500 Doctors of Medicine and Doctors of Philosophy in medical sciences accepted fellowships between 1946 and 1958, under the major national programs alone, to continue their studies and extend their abilities. The number of physicians applying for postdoctoral fellowship awards under these programs for the year 1956-1957 was equal to approximately 10% of the number of physicians graduating from medical schools annually in recent years. Doctors of Philosophy seeking these fellowships in the same year were equal in number to about half of the current annual production of Ph.D.'s in the medical sciences.

Moreover, the survey indicates that fellowships have a potential role far beyond that which is being realized under the present fellowship system. Recent medical graduates indicated a real dissatisfaction with the breadth and depth of their basic scientific backgrounds. Some 40% of 1958 interns and residents in university hospitals want opportunities to eliminate their scientific deficiencies in the physical and biological sciences through postdoctoral programs of a kind that could best be provided by fellowships. Sixty-five per cent of the interns and residents regarded more and better training in scientific investigation as essential to their future careers, regardless of the nature of those careers.

The programs of twenty-two agencies awarding postdoctoral fellowships in national competition were selected for inclusion in the survey. The 4,500 persons who received fellowships from these agencies over the 12-year period 1946-1958 were consulted. Because of ambiguity in the fellowship concept, it was necessary to define very carefully the pattern of the fellowships to be studied. The terms "fellow" and "fellowship" may be used to indicate a wide variety of situations, ranging from assistantships, apprenticeships, research associations, and salary subsidies for part-time teaching, to honors and financial awards to senior scientists for support of their research and leaves for sabbatical study. The Medical Fellowship Board selected for inclusion in the survey those programs that have a direct influence on the development of medical scientists, and that conform in general to a common pattern. To be eligible for one of these fellowships, the candidate must have received a Doctor's degree in medicine or in one of the medical sciences. Essentially full-time application to research and study in a fundamental science of medicine is stipulated. Awards are made for periods of at least six months, usually for a year or more.

In the course of the survey, three trends in medical research and education, and their consequences, have held the attention of the Board. The increasing significance of these trends, together with information coming from the survey, led the Board to the conclusion that its forty-year program of traditional fellowships had accomplished its purpose and should be replaced by a more appropriate program, recognizing the trends and meeting the developing needs of academic medicine.

1. *The traditional and sometimes artificial boundaries between the "Basic" sciences and between the preclinical and clinical sciences are fading.* This process is accelerated as determined individuals gain competence in the concepts and techniques of hitherto unrelated scientific disciplines and bring this competence to bear in their own special fields of interest. Such scientists are as yet few in number, but they suggest a prototype for development consistent with the trend. Recognizing this increasing interdependence of disciplines, some of the medical schools already are experimenting with departmental reorganization and teaching from an inter-disciplinary point of view.

2. *The pattern and character of clinical research are undergoing rapid and dynamic changes.* The best trained clinical scientists are engaging in research on an unprecedented scale, and financial support for their efforts now is abundantly available. "Clinical" research has shifted to include investigations of the fundamental scientific explanations of clinical phenomena. Developments in basic science and their potential for clinical medicine make new demands of clinical investigators and especially of teachers. The clinical scientist must prepare himself according to a new pattern if he is to meet effectively the challenges offered. If he is to play a part in clinical academic medicine, he must become a truly competent physician as well, and the survey indicates that the clinically oriented investigator will not yield on this point. As investigators, physicians and teachers, scientists of this kind can help span the gap between "basic" and "clinical" research. These three roles, equally developed, should ensure the early application to the patient of the impressive advances in fundamental sciences. A new opportunity and a new responsibility thus exist for clinically competent medical scientists.

These responsibilities and opportunities exist equally for the medical scientist in nonclinical fields. The influence of basic sciences on medicine, and medicine's dependence upon them, is so complex that the basic scientist faces a new relationship with the clinician in academic medicine.

3. *A steady attrition in faculty members oriented primarily to the full range of university-medical school obligations is developing in academic departments.* The unprecedented expansion of financial resources for the support of medical research has led frequently to the subordination of primary academic responsibilities to extramurally inspired preoccupation with research. Many faculty members today are lodged in academic halls but look outside their institutions for financial support. Some find it desirable not to engage at all in academic careers. If continued, this trend must necessarily lead to weakening of the new research structure itself, through failure to replace the academic deficit created by this attrition. The inspiration, education, and training of his scientific successors must keep pace with the scientist's research activities; it must not be relegated to a secondary or casual position.

The wisdom of the vast expansion of support of medical research in recent years is not questioned. It is the lack of balance, the rigidity and excesses of the present system, with its dangers to academic medicine, that is disturbing.

The Board in proposing its new fellowship program suggests a qualitative reorientation of the pattern for the scientific development of fellows. Fellowships should influence the young scientists to appreciate the opportunity, indeed the privilege, of meeting the other major responsibilities of academic life in addition to research, although not at the expense of research. The new proposal includes a plan for establishing the fellow ultimately in an appropriate academic position in an effort to restore the balance which has been upset by the depletion of academic faculties.

The very generous support of the John and Mary R. Markle Foundation, which also made the survey possible, and of the Donner Foundation, is providing the Medical Fellowship Board with an opportunity to experiment with its new fellowship proposal through the conduct of a small pilot program. The first fellows appointed under the experiment are at work, and additional appointments will be made during the present academic year. It is hoped that the program will be open for general applications in the very near future. Meanwhile, through this opportunity to experiment, a precise format will be established.

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The new fellowships, provisionally designated "National Research Fellowships in Academic Medicine", have these characteristics and qualifications:

1. They are offered to young medical scientists who have special aptitude and interest in careers in academic medicine.

2. Preparation for the assumption of the major responsibilities of university faculty membership is emphasized. The fellow must prepare for leadership in the advancement of scientific knowledge through imaginative and well-conceived research. Of at least equal importance, he must make of himself a competent instructor, able to interpret cumulative scientific experience and theory to the students who will be his academic, scientific and professional successors.

3. In planning to meet these responsibilities, the fellow should recognize the increasing interdependence of the scientific disciplines, the fading of boundaries which have tended to restrict the interests of medical scientists to one or another of the traditional disciplines. During his fellowship period, he should equip himself to draw upon and use the concepts and techniques of those fields of science (e. g., biology, chemistry, physics and mathematics) which have special pertinence to teaching and research in his own area of interest.

4. The National Research Fellowships in Academic Medicine are offered in two categories:

(*a*) One category is open to holders of doctorates in medicine, or in biology, chemistry, physics, mathematics and related scientific fields with special qualifications for, and interest in, productive careers in *basic science departments* of the medical schools.

(*b*) The second category is open to holders of doctor's degrees in medicine who have superior clinical training as well as special qualifications for, and interest in, productive careers in *clinical departments* of the medical schools.

In both categories applicants' programs will be weighed especially for their appropriateness, in the long-range view, for careers in the *academic department* and *scientific area of their interests.*

5. Fellowships in both categories will consist of two phases: A "preparatory" phase of approximately two years, and an "academic" phase of approximately three years.

The "preparatory" period will be devoted to *nonclinical* scientific study including formal course work wherever necessary. Such studies will be planned on an individual basis, determined by the area in which the fellow will make his career, and dictated by the trends which influenced the Board to establish the new program. A definitive program for the development of competence as a competent instructor and original investigator will be included in the program.

In the "academic" phase of three years, the Medical Fellowship Board and a cooperating university will participate in supporting the fellow in a regular academic position. At this point, the fellow will begin to assume the full responsibilities of academic life. The opportunities and program proposed for this phase will be reviewed by the Board with the participating university, the fellow, and his advisors, for its appropriateness to the objectives of academic institutions and the interests of the candidate.

6. These fellowships are intended for the young scientist who is mature and who shows insight and conviction as to his future plans. His ability and determination to chart a course of preparation consistent with his long-range interests and the developing trends in academic medicine will weigh heavily in the selection process. These fellowships are not appropriate for medical scientists who are seeking general educational opportunities and who are not yet certain of the precise nature of their career ambitions. Fellowships comparable to the traditional program of the Academy-Research Council now exist in several modifications under the competent direction of many agencies. These provide excellent opportunities for young scientists while they are discovering their interests and crystallizing their future plans.

The Medical Fellowship Board and the Division of Medical Sciences recognize the difficulties they face in establishing the new program on the basis of these proposals. However, the experience gained thus far in the experiment and the insight, cooperation, and enthusiasm demonstrated by candidates and medical educators alike, justify the hope that their highest expectations will be realized.

THE NATIONAL SCIENCE FOUNDATION

The following résumé of the activities of the National Science Foundation, in so far as they are related to medicine through grants for basic research in the medical sciences, grants for short-term medical research, conferences and symposia supported by the foundation, and fellowships for study at the graduate and postdoctoral level, has been submitted by the Public Information Office of the Foundation.

The National Science Foundation, an agency of the federal government, was established by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." The foundation carries out its mission by supporting basic research in the sciences, programs for improving science education, conferences and symposia on special aspects of science, studies of manpower supply and demand, programs for making scientific information more readily available, and the compilation of data on the national effort in scientific research and development.

TABLE 47.—*NSF Support of Activities (Research and Conferences) of Interest to Medical Profession*

	Fiscal Year 1958		Fiscal Year 1959	
	No.	Amt., $	No.	Amt., $
Basic medical research grants	24	559,600	122	3,391,250
Short-term research by medical students	17	193,200	30	364,600
Conferences and symposia on subjects of medical interest	1	20,000	1	25,000

Of particular interest to the medical profession are the foundation's grants for basic research in the medical sciences, grants for short-term medical research, and fellowships for study at the graduate and postdoctoral level (table 47).

Basic Research

Grants are made to help competent scientists conduct basic research in the sciences, principally at universities and colleges. Normally, proposals are originated by the scientist and are endorsed and submitted by his institution. Basic research is supported in the mathematical, physical, medical, biological, engineering and other sciences, including to a limited extent, the social sciences. In fiscal year 1959 the congressional appropriation to the foundation for the support of basic research was about $40,000,000. Approximately $20,000,000 was expended in support of the life sciences.

Short-Term Medical Research

In an effort to increase the number of scientists qualified to perform basic research in medical fields, the foundation sponsors a program designed to encourage medical school students to pursue careers in research.

Medical school students constitute one of the largest sources, relatively untapped, of medical research scientists. The medical curriculum is essentially instructional, offering little, if any, opportunity for students to pursue research and become familiar with its methods or challenges. The foundation seeks to introduce medical students to the techniques of basic research by means of its grants to medical schools for the support of short-term research by students during free-quarter periods. Without interfering with the medical curriculum, the program provides opportunities for carefully selected students to determine their interest in and aptitude for research. Student research is conducted under the supervision of qualified members of the medical school staff.

In 1956, the foundation began this program experimentally. In the three years of its operation, the program has expanded considerably and now includes 63 medical schools in the nation. A total of $847,250 has been granted for this purpose.

Conferences and Symposia

The conferences and symposia supported by the foundation provide excellent opportunity for the interchange of information and ideas among experienced investigators, as well as an opportunity for younger investigators to meet and obtain information and advice from some of the world's foremost scientists. Approximately 25 such conferences are supported each year. In FY 1959 there was one such conference of special interest to those in the medical profession and one in 1958 (table 47).

Additional information on the support of research grants in the medical sciences may be obtained from the Division of Biological and Medical Sciences, National Science Foundation, Washington 25, D. C.

Fellowships

The Fellowship Programs of the foundation are designed to strengthen the nation's scientific potential by providing support for advanced training in the sciences directed toward the development of highly qualified scientists and for further study in the sciences directed toward increasing the competence of college science teachers.

Fellowships are offered for graduate study in the physical, medical, biological, and engineering sciences; anthropology and psychology (excluding clinical); certain interdisciplinary fields, and in selected social science fields (in all except Science Faculty Fellowship program). These fellowships are limited by law to citizens of the United States. A fellow may study under his award at any accredited nonprofit American or nonprofit foreign institution of higher education.

Awards are not made to individuals to pursue a course of study designed to prepare them for careers in medical practice or other clinical fields;

nor for support of residency training or similar work leading to qualification in a clinical field. Applications are accepted, however, from students who intend to obtain advanced training in one of the medical sciences directed toward a career in research. An individual who holds a degree such as M.D., D.D.S., or D.V.M. and desires to continue training for a career in research is eligible to apply for a postdoctoral award provided he can present an acceptable plan for study and research.

Six fellowship programs are offered—the graduate, cooperative graduate, summer fellowships for graduate teaching assistants, postdoctoral, senior postdoctoral, and science faculty. The graduate program is open to students studying for masters or doctoral degrees in science. The three predoctoral levels, first-year, intermediate-year, and terminal-year, carry base stipends of $1,800, $2,200, respectively, with allowances for travel and dependents. Approximately 1,100 graduate fellowships were offered during 1959. The cooperative graduate program was initiated in fiscal year 1959 and differs from the older graduate program in certain operational aspects. A stipend of $2,200 is associated with these awards. Approximately 1,050 awards were offered in 1959. The graduate teaching assistants program, introduced in fiscal year 1959, offered support during the summer months in 1959 to 580 students.

The postdoctoral program is available to those who have earned a doctoral degree or have had research training and experience equivalent to that represented by such a degree. The stipend is $4,500 with allowances for travel and dependents. These awards are made semiannually, and 194 were offered in 1959.

The objective of the senior postdoctoral program is to provide senior, established scientists an opportunity to increase their competence as investigators in their own or related fields. These scientists should have held their doctoral degree for a minimum of five years. A salary-matching stipend is awarded, up to a maximum of $12,000. Approximately 75 such fellowships are awarded each year.

To increase the effectiveness of the teaching of college science teachers, the foundation awards annually science faculty fellowships to teachers with three years college teaching experience and plan to continue teaching. A salary-matching stipend is given up to a maximum of $12,000; 302 such fellowships were offered in 1959.

During fiscal year 1959, 50 fellowships were awarded in the medical sciences. There were 11 graduate, 10 cooperative graduate, 6 teaching assistants, 10 regular postdoctoral, 4 senior postdoctoral, and 9 science faculty fellowships. In addition, 114 were offered awards in biochemistry, 20 in biophysics, 30 in general biology, 57 in genetics, 42 in microbiology and 210 in zoology. These are the classifications of the applicants themselves.

Additional information on the various fellowship programs of the National Science Foundation may be obtained from the Fellowships Section, Division of Scientific Personnel and Education, National Science Foundation, Washington 25, D. C.

EDUCATIONAL VALUES OF THE GRANTS AND TRAINING AWARDS PROGRAMS OF THE UNITED STATES PUBLIC HEALTH SERVICE

Because of their rapid growth since 1945 and their contribution and impact on undergraduate medical education, graduate education and training, and on the research activities and potentials of medical schools, any current report on Medical Education in the United States would be incomplete without presentation of the Educational Values of the Grants and Training Awards Programs of the United States Public Health Service. The following information reviewing the current status of these programs was prepared and submitted by the Public Health Service, United States Department of Health, Education, and Welfare.

Several programs of the United States Public Health Service are of interest to the field of medical education. The programs of grants and training awards in the medical and related sciences help add to the nation's supply of trained personnel in the life sciences. These programs are of several types: (1) research fellowships, (2) training grants and traineeships, (3) research grants, and (4) health research facilities construction grants. In addition, the Public Health Service administers traineeship programs for professional nurses and public health personnel. Finally, the Service conducts a number of intramural training programs in its own hospitals and research centers.

The research grants and awards programs are administered through the Public Health Service's principal research bureau, the National Institutes of Health. Although research is conducted at the NIH laboratories in Bethesda, Md., by far the major portion of the annual appropriations—some two-thirds this year—help support research studies and training in nonfederal institutions. In fiscal year 1959, grants for these purposes amounted to 200 million dollars, about 50% of which supported activities in the medical schools.

A wide range of medical and biological investigations and of training activities is aided by the Institutes: National Cancer Institute, National Heart Institute, National Institute of Allergy and Infectious Diseases, National Institute of Arthritis and Metabolic Diseases, National Institute of Dental Research, National Institute of Mental Health, and National Institute of Neurological Diseases and Blindness. In addition, the NIH's Division of General Medical Sciences administers a program of grants for training and research studies not falling

within the categories of the seven Institutes. The Division of Research Grants provides central review and processing for all the grants programs of the National Institutes of Health, has important functions with regard to research fellowship programs, and administers grants for the construction of health research facilities.

Nine national advisory councils, established by law and composed of nonfederal leaders in medical science, education, and public affairs, review all grant applications within their respective areas and recommend action to the surgeon general of the Public Health Service. The councils are assisted by nearly 40 study sections—panels of outstanding specialists, mostly nonfederal—who provide initial review of research project applications for scientific merit. In addition to these specific functions, the councils and study sections, as well as various special committees and review groups, contribute overall guidance to the research grant and training activities.

In fiscal year 1959, approximately 8,500 people in nearly 400 schools and research centers were aided through the training grants and fellowships programs. In the same year, an estimated 9,250 research projects were supported through grants totaling about $142,000,000. These grants provide indirect educational and teaching values.

These, and other kinds of Public Health Service programs of interest to medical education through both direct and indirect educational relationships, are presented in the following brief summaries. (Further information may be obtained from the Division of Research Grants, National Institutes of Health, Bethesda 14, Md.)

Research Fellowships

Research fellowships are intended to increase the number of scientists qualified to carry on independent research. Seven types of fellowships are presently available:

1. Predoctoral research fellowships are awarded to students with a bachelor's degree or equivalent, for the pursuit of graduate research training in the fields related to the health sciences. Stipend rates are $1,800, $2,000, and $2,200 for the first, second, and third years, respectively. Allowances for dependents, travel, and tuition are added to the stipend. An allowance of $250 may be paid to the sponsoring institution to defray unusual expenses.

2. Postdoctoral research fellowships are awarded to qualified persons holding a Doctor's degree in medicine, dentistry, or related fields. Stipend rates are $4,500, $5,000, and $5,500 for the first, second, and third years, respectively. Allowances for dependents, tuition, and travel are added to the stipend.

3. Special research fellowships are awarded to qualified candidates who have demonstrated unusual competence in research or who require specialized research training. The stipend, including necessary allowances, is determined at the time of the award.

4. Student part-time research fellowship grants are awarded to schools of medicine, dentistry, nursing, and public health. The awards are designed to give students in the health sciences an opportunity to explore the research field in the hope that many of those supported will enter into full or part-time research careers. Units of $600 are provided for part-time research work during the school term or full-time research work for two months during any time when curriculum work is not scheduled for the student.

5. Senior research fellowship grants are awarded to schools of medicine, dentistry, and public health in support of competent scientists who wish to conduct research and teaching in the preclinical sciences. These fellowships provide support between the completion of postdoctoral training and the time of eligibility for appointment to permanent or higher academic posts. The awards are made for five-year periods, are renewable, and provide for salary plus partial research expenses not exceeding $2,000. Senior research fellows may also apply for additional support for their research needs.

6. Post-sophomore research fellowship grants are awarded to schools of medicine and dentistry for support of students who wish to obtain research training prior to completion of their professional degrees. Participants must be willing to drop out of regular courses for one, two, or three years. The stipend is set by the school in amounts not to exceed $3,200 annually. Allowances for dependents and tuition are added to the stipend. A special allowance of $250 may be paid to the sponsoring institution to defray unusual expenses.

7. Foreign research fellowships are awarded to a limited number of scientists who wish to study in United States laboratories. The purpose of the program is to provide an opportunity to strengthen medical research by mutual exchange of research methods, scientific philosophy, and cultural values. Nominations are made by respective national research organizations in each western European country. Candidates must have (*a*) completed a doctoral degree in one of the medical or related sciences and demonstrated proficiency in research, (*b*) made satisfactory arrangements with the laboratory in the United States where training will be obtained, and (*c*) acquired a workable reading and speaking knowledge of the English language. Scientists will be brought to the United States on an exchange visitor's visa, which requires return to the homeland for a period of at least two years at the end of the training period. The basic stipend is $4,500 per year. Dependency, travel, and certain other allowances are added to the stipend.

Training Grants and Traineeships

Training grants are intended to augment the nation's supply of qualified scientific investigators by assisting in the establishment, expansion, and improvement of training and instructional programs in universities and other institutions. Aid to the institution is provided by grants in two general classes—undergraduate and graduate.

1. Undergraduate training grants are awarded to schools of medicine, dentistry, nursing, and public health to assist in developing expanded and better integrated undergraduate instruction relating to the prevention, diagnosis, and treatment of cancer, mental illness, and cardiovascular diseases. It is the responsibility of the institution to determine the most appropriate use of the funds.

2. Graduate training grants are awarded by all the Institutes and by the Division of General Medical Sciences to public and private nonprofit institutions interested in providing special training for researchers, teachers, and prospective practitioners interested in public service. Funds may be used to improve facilities and to provide salaries for faculty and staff, stipends for trainees and necessary supplies and materials.

Special new training grants programs are being established also in fields of special need through the Division of General Medical Sciences and other NIH units. For information on these programs, write either to the Division of General Medical Sciences, NIH, or to the Associate Director for Training, NIH.

Traineeship awards are intended to increase the number of investigators by encouraging advanced training in specialized areas of medical research. Examples of interest are the neurological diseases, ophthalmology and sensory diseases, diagnosis and treatment of cancer, and arthritis, diabetes, and other metabolic diseases.

Regular or special traineeships are awarded directly to American citizens and to aliens who have signed a Declaration of Intent. A doctoral degree in health fields, including related biological and behavioral sciences, is also a prerequisite. Traineeships are available through the National Cancer Institute, the National Institute of Arthritis and Metabolic Diseases, and the National Institute of Neurological Diseases and Blindness. The National Heart Institute and the National Institute of Mental Health provide traineeships under training grants awarded to institutions for this purpose.

The regular traineeship award carries a stipend level that begins at $3,800 per year (with the exception of the National Institute of Arthritis and Metabolic Diseases traineeships, which start at $4,500) and includes dependency allowances and certain travel allowances. No allowances are made for tuition or supplies.

Special traineeships are awarded by the National Institute of Neurological Diseases and Blindness and the National Institute of Arthritis and Metabolic Diseases in varying amounts to qualified individuals who possess unusual competence for training or who require specialized training for a specific problem. The trainee may study at the institution of his choice. The stipend is determined by the cost of training and by the particular qualifications of the applicant; it ranges between $6,500 and $17,500.

Public Health and Professional Nurse Traineeships

The public health traineeship program of the Public Health Service supports graduate and specialized public health training for individuals who have completed their basic professional education and plan employment in the field of public health. Awards are made directly by the Public Health Service, by schools of public health, and by nursing schools that prepare graduate nurses for beginning positions in public health. These traineeships are awarded to physicians and to members of other professions who engage in public health work, such as dentists, veterinarians, nurses, sanitary engineers, health educators, sanitarians, nutritionists, and others. The traineeships include payment of stipends, tuition and fees, and certain travel expenses. About 650 traineeships are awarded each year, approximately half of which support public health training for nurses.

A limited number of similar traineeships are available to professional personnel who are or plan to be engaged in the prevention and abatement of community air pollution. These traineeships support specialized training related to the effects, extent, assessment or control of air pollution.

Applications for public health or air pollution traineeships may be obtained from any of the regional offices of the Public Health Service or from the Chief, Division of the General Health Services, Bureau of State Services, Public Health Service, Washington 25, D. C.

Another Public Health Service program provides traineeships for professional nurses who are interested in teaching, supervisory, and administrative positions. Stipends of $2,400 to $3,600 plus tuition, certain travel fees, and dependency allowances of $360 are available through schools of nursing. This program is administered by the Division of Nursing Resources, Bureau of Medical Services.

Research Grants

Research grants are made to universities, medical schools, hospitals, laboratories, and other public or private institutions and to individuals for support of research in health, medicine, and allied fields. The major objectives are: to expand medical and biological research in scientific institutions throughout the country, and to stimulate new investigations

in fields needing exploration. The program also provides training, indirectly, for the scientific personnel engaged in the research work. The funds provide for salaries, equipment, supplies, travel, overhead, and certain other expenses.

Each institute makes grants for research within its area of interest, and a general NIH appropriation supports studies outside the scope of the seven Institutes.

This year there will be some 9,250 research grants awards in every part of the country. Some 5,000 or so professional papers will be published by research grantees in a wide variety of journals as a result of this work.

Field investigation grants, awarded by the National Cancer Institute, support developmental research, community studies, and surveys that will contribute to the prevention, control, diagnosis, and treatment of cancer in the general population.

The Public Health Service also administers grants for special research projects. Among these are investigations of the health aspects of air and water pollution, projects for the development and utilization of hospital facilities and resources, and studies to improve nursing education and service. The projects are administered by the Division of General Medical Sciences, NIH, for the sponsoring divisions in the Bureau of State Services (the Division of Sanitary Engineering Services and the Division of General Health Services) and in the Bureau of Medical Services (the Division of Hospital and Medical Facilities and the Division of Nursing Resources).

Health Research Facilities Grants

Under the Health Research Facilities Act of 1956, the Congress authorized a program to assist in the construction of laboratories and other facilities for the conduct of health research. The program provides grants-in-aid on a matching basis to public and private nonprofit institutions. The amount of federal funds awarded may not exceed 50% of the total costs of the research portion of the facility, and the remaining sum must be provided from nonfederal sources. Each year since 1956, the sum of $30,000,000 has been appropriated for this program, and several hundred awards have been made to institutions in all parts of the country. As a result, many new research facilities are now in operation that would not otherwise have been made possible.

Training for Public Health Service Careers

The Public Health Service, in its widespread and diversified programs, offers many career opportunities to competent physicians. Training is provided in various areas of medicine, including patient care, clinical research, basic laboratory research, epidemiology, preventive medicine, quarantine duty, foreign service, and public health administration.

Most of the Service's physicians are officers in the Commissioned Corps, which has served this country with distinction since 1873. A young physician or medical student may enter the Corps (1) through the Commissioned Officer Student Training and Extern Program (COSTEP), (2) as an intern upon graduation from medical school, and (3) as a medical officer after nonservice internship.

Clinical assignments are available in most of the Service's 16 general and special hospitals and in many of its 56 hospitals for American Indians and Alaskan natives. Postgraduate medical education in the teaching hospitals is conducted by chiefs of service (who are certified or eligible for certification by their specialty boards), with the assistance of well-qualified personnel and outstanding consultants from local hospitals and medical schools. Approved internships are also offered in dentistry, dietetics, and pharmacy.

Rotating internships consisting of assignments planned to round out a young physician's education are available in the Service's hospitals at Baltimore, New Orleans, New York, Norfolk, San Francisco, Seattle, and Boston. The schedule provides four months of medicine, four of surgery, two of pediatrics, and two of obstetrics. Mixed internships, available at the Public Health Service hospital in Boston, provide six months of medicine and six of surgery.

In addition to the usual educational requirements, the applicant for appointment as a medical intern must: (1) be in good health, (2) be an American citizen, and (3) submit an application for a reserve commission in the Public Health Service. Those who have satisfactorily completed the year's internship may apply for continuing assignment with the Service. They are eligible to take the examination for appointment in the regular corps.

In addition to the internships, Public Health Service hospitals offer approved residency training in the following specialties: surgery, general practice, internal medicine, orthopedics, urology, anesthesiology, dermatology and syphilology, ophthalmology and otolaryngology, pathology, radiology, and psychiatry. The National Institutes of Health's Clinical Center, a 500-bed research hospital at Bethesda, Md., offers residency training in internal medicine, neurology, ophthalmology, pathology, psychiatry, and radiology. Residents are usually selected from the Commissioned Corps.

Through the Commissioned Officer Residency Deferment (CORD) program, Public Health Service offers qualified physicians the opportunity to obtain deferment from the military service under the Universal Military Training and Service Act. Physicians are commissioned in the Reserve Corps of Public Health Service and deferred from active duty to obtain residency training in essential specialty fields. After completion of training, participants must serve their obligatory time with Public Health Service. No additional military service is required.

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The program known as COSTEP provides employment for a limited number of medical and dental students during the vacation months for duty at Public Health Service hospitals, research laboratories, and other facilities. Appointments are offered to students who will have completed their sophomore year of professional education by July 1 and are interested in becoming reserve officers in the Commissioned Corps.

Information concerning employment in the Public Health Service may be obtained from the Surgeon General, United States Public Health Service (P) Washington 25, D. C.

Visiting Scientist Program

The visiting scientist program is a flexible arrangement for inviting outstanding American and foreign scientists to utilize the laboratory and clinical research resources of the National Institutes of Health. Two classes of appointment are available—"visiting scientist" and "research associate in the visiting scientist program." Participants must have a doctoral degree or the equivalent background, at least six years of postgraduate experience, and exceptional ability in a specific research problem. The salary range is from $5,400 to $12,600 a year. The purpose of the program is to increase the utility of the National Institutes of Health as a national resource and to strengthen interrelations with the broader scientific community.

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Conferences and Seminars

To encourage early and adequate exchange of information among investigators, numerous conferences, seminars, and symposiums are supported in connection with the grants and training programs. Many of the meetings are initiated and sponsored by the advisory study sections of the Division of Research Grants.

In addition, the Institutes and Divisions, separately or as a whole, present lectures, seminars, and clinical conferences. Frequently there is active participation by faculty members of universities and medical schools, staffs of other research centers and Public Health Service hospitals, physicians in private practice, and other leaders in the medical sciences.

CONTRIBUTIONS OF THE OFFICE OF VOCATIONAL REHABILITATION TO MEDICAL EDUCATION AND RESEARCH

Since 1954 the Office of Vocational Rehabilitation, under authority of the Vocational Rehabilitation Act, has offered direct and indirect aid of five types to medical education and research. The following summary of various grant programs administered by the Office of Vocational Rehabilitation which have an impact on medical education has been prepared by its administrative staff for the Education Number of The Journal.

The Office of Vocational Rehabilitation, Department of Health, Education, and Welfare, offers direct and indirect aid to medical education. Direct aid is available in the form of long-term teaching grants and short-term course or institute grants to the schools. Less direct but significant support is provided through research grants, research fellowships, and traineeships. These five types of aid, made possible under authority of the Vocational Rehabilitation Act of 1954, may be summarized as follows:

1. Teaching grants assist medical schools in initiating, expanding, or improving teaching in the rehabilitation phases of medicine. The number of medical schools receiving teaching grants has increased from 6 in 1956 to 25 during the 1958-1959 academic year. Averaging from $15,000 to $25,000, the grants are intended to provide part of the costs of the teaching program. Generally, they cover the salary of a faculty member coordinating the program, payment for the part-time services of supporting staff, and the purchase of instructional equipment or materials. The duration of these grants is one year with provision for reapplication by the institution for continued support.

2. Grants are made for institutes or short-term training courses designed to stimulate interest in rehabilitation or to increase the specialized knowledge of rehabilitation philosophy and methods. In 1958-1959, courses were conducted in geriatric rehabilitation, neuromuscular facilitation techniques, esophageal speech, aphasia, and rehabilitation in surgical conditions. One course was held for physicians working as medical consultants in state vocational rehabilitation agencies on administrative problems encountered in such consultation, and others are planned for the future. In 1958-1959, courses in prosthetics and orthotics reached over 1,000 physicians and surgeons, physical and occupational therapists, prosthetists, orthotists, and personnel from State vocational rehabilitation agencies. Since 1954, courses in rehabilitation of the upper or lower extremity amputee and in functional bracing of the upper extremities have reached about 3,400 physicians and associated personnel.

3. Traineeship grants in medicine serve the purpose of increasing the nation's supply of qualified physiatrists. They were given during the past academic year to 30 institutions offering approved residency programs in physical medicine. From this source the institutions, in turn, awarded traineeships to individual physicians. The number of physicians receiving this type of support has increased from four on July 1, 1955, to 105 on June 30, 1959. In these four years traineeship assistance has increased from about $287,500 in 1956 to over $739,000 in 1959.

Office of Vocational Rehabilitation funds have also been used in several institutions to provide part-time training in rehabilitation for residents in internal medicine, orthopedics, urology, neurology, neurosurgery, and psychiatry.

4. Research and demonstration grants are available for the partial support of projects aimed at developing more effective methods and techniques for the vocational rehabilitation of disabled persons. The grants are recommended for approval by the National Advisory Council on Vocational Rehabilitation which is composed of medical, educational, and scientific members who are established authorities in fields concerned with vocational rehabilitation. Sponsors of research and demonstration projects must pay part of the total cost of the project, but there is no specific matching requirement. It is expected, however, that contract authority will become available permitting payment of the full cost of selected projects.

Projects are being encouraged in the following categories: (*a*) studies designed to determine physiological changes which occur during treatment and retraining in physical rehabilitation; (*b*) the development of new and improved diagnostic techniques; (*c*) investigations to elucidate the dynamics of individual and group motivation as a factor in success or failure of physical medicine procedures; and (*d*) projects for developing quantitative methods for evaluating functional capacities of disabled individuals.

As the Research and Demonstration Grant Program has developed, an increasing number of projects are being carried on by medical schools, hospitals, and medically oriented organizations. In addition, many projects sponsored by other types of agencies are under medical supervision.

5. Research fellowships may be awarded to assist qualified candidates to pursue advance training for research or to undertake a research project which holds promise of advancing knowledge of the vocational rehabilitation of disabled persons. Three types of fellowships are available: predoctoral, postdoctoral, and special. The awards are made on an annual basis and are subject to a limitation of two years.

The programs of the Office of Vocational Rehabilitation in aid to medical education are based on long-standing practices of co-operation with state and local agencies and educational institutions. National advisory committees play a major role in the administration of the office's educational grants program. These committees, composed of leaders in the educational, research, and administrative phases of the various rehabilitation disciplines, have helped to formulate the policies and basic principles which govern the grant programs for medical education. Academic freedom for the institutions and individuals receiving grants is a primary consideration. The intent of Congress, the recommendations of the advisory committees, and the traditions and experience of the Office of Vocational Rehabilitation provide maximum safeguards for that freedom. In carrying out the over-all program, every effort is made to insure the widest distribution of funds, taking into consideration the number and quality of the projects and the available resources.

MEDICAL EDUCATION FOR NATIONAL DEFENSE

The following information on the status of Medical Education for National Defense, current to July 1, 1958, was submitted by the office of the national coordinator of the program.

The Medical Education for National Defense (MEND) program is at present active in 55 medical schools in the United States, and 15 additional schools have been selected for affiliation effective Oct. 1, 1959. Requests for affiliation have consistently been in excess of the program's ability to expand, and a waiting list for affiliation is maintained.

The 55 schools now taking part in the program are Albert Einstein, Baylor, Boston University, Bowman Gray, Buffalo, California (San Francisco), UCLA, Cincinnati, Colorado, Columbia, Cornell, Creighton, Duke, Emory, Georgetown, George Washington, Howard, Illinois, Indiana, Iowa, Kansas, Louisiana State, Louisville, Marquette, Maryland, College of Medical Evangelists, Meharry, Miami, Michigan, Mississippi, Nebraska, State University of New York (Syracuse), NYU, North Carolina, Northwestern, Ohio State, Oklahoma, Pennsylvania, Pittsburgh, Puerto Rico, Rochester, Stritch, Temple, Texas (Galveston), Texas (Southwestern), Tufts, Tulane, Vanderbilt, Vermont, Medical College of Virginia, University of Virginia, Washington University (St. Louis), University of Washington (Seattle), Western Reserve and Wisconsin.

The schools which have been selected for affiliation effective Oct. 1, 1959, are Albany, Arkansas, University of Chicago, Hahnemann, Jefferson, Minnesota, Missouri, New York Medical College, South Dakota, Southern California, Tennessee, Utah, Wayne State, West Virginia, and Woman's Medical College of Pennsylvania.

MEND is a function of the Committee on MEND of the Association of American Medical Colleges; it is endorsed by its parent organization, by the American Medical Association Council on Medical Education and Hospitals and the Council on National Defense, and by medical officials of the Department of Defense, Army, Navy, Air Force, Public Health Service, Atomic Energy Commission, and the Office of Civil and Defense Mobilization.

The purpose of the program is to encourage the teaching of military and disaster medicine by regular faculty members of the nation's medical schools. The emphasis throughout is on medical, rather than military, aspects. Nothing is mandatory; each faculty is free to reject any part of the program which it may deem inconsistent with the local principles of medical education. Through successful operation of the MEND program, the problem of

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national preparedness in medical education can be solved by interested faculty members on a local basis and under local control rather than through such methods as the establishment of a federal medical school or through direct federal intervention in curricular content.

Every year MEND sponsors a series of symposia, which are conducted by federal medical personnel for the benefit of faculty members of medical schools. During 1958-59, five symposia were held. Their topics, the agencies conducting them and their locations were: "Infectious Disease Problems," Walter Reed Army Institute of Research, Washington, D. C.; "Medical Operations and Research in Climatic and Environmental Extremes," U. S. Naval Medical School, Bethesda, Md.; "Research and Development in Aviation and Space Medicine," USAF Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio; "Nutrition under Wartime or Disaster Conditions," U. S. Army Medical Research and Nutrition Laboratory, Denver, Colo.; and "Radiation Health Problems," Division of Radiological Health, Public Health Service, Washington, D. C. An Average of 85 medical school faculty members attended each of the symposia. Every year MEND also conducts an Orientation Tour for deans and MEND coordinators of schools newly affiliated with the program. The tour is designed to introduce them to current medical research, practices, and facilities in the federal services.

Activities at the 55 schools have included special lectures, conferences, and demonstrations in the following subjects: surgery of trauma, wound ballistics, war wounds, radiobiology, defense measures against chemical and biological warfare, aviation medicine, management of mass casualties, civil defense responsibilities of the medical profession, infectious disease problems in disaster conditions, and others. Several large-scale exercises have been conducted by the schools in cooperation with local civil defense authorities, using the 200-bed emergency hospitals provided by OCDM.

The office of the national coordinator of MEND is located in the Bureau of Medicine and Surgery, Department of the Navy, Potomac Annex, Washington 25, D. C.

NATIONAL DEFENSE AND MEDICAL EDUCATION

SELECTIVE SERVICE SYSTEM

The following information, current as of July 1, 1959, has been submitted by the Selective Service System National Headquarters.

The responsibility for primary classification of registrants rests with Selective Service local boards. If a person or his employer (college, medical school, or hospital) has requested his deferment and he has been classified as available for military service, the person or his employer may, within 10 days of the mailing of the notice of classification, file an appeal. The appeal will be reviewed ordinarily by the appeal board having jurisdiction where the registrant's local board is located, but it may be transferred for review to the appeal board having jurisdiction in the area where the registrant is working or attending college if this is requested in writing when the appeal is made. If the state appeal board should sustain the classification, the registrant or his employer may, if there is a dissenting vote in the appeal board, file a written request with the local board to have the decision appealed to the President. If there is no dissenting vote, the state or national director of Selective Service may appeal the case to the President.

The Undergraduate College Student Certificate (SSS form 109) will be used for undergraduate students entering institutions of higher learning. The Graduate or Healing Arts College Student Certificate (SSS form 103) will be used for postgraduate students entering medical school in furnishing the Selective Service local boards with information regarding registrants who are enrolled as students in these institutions. These forms should be submitted to the local boards by the educational institution on request of the registrant. However, the mere filing of such a form does not constitute a request for occupational deferment, since, in order to establish the right of appeal as an interested party, a written request from the college or employer for occupational deferment must accompany the form. The registrant has the right of appeal if exercised in the prescribed 10 days. He may make his appeal informally in writing.

Eligibility for Consideration for Deferment

The law empowers the President to provide for the deferment of any person whose deferment is equitable and in the national interest. Furthermore, it is the sense of Congress that provision should be made for the annual deferment from training and service of premedical, predental, and allied preprofessional students in numbers equal to those at present (1950) in attendance at colleges and universities as outlined in the general student deferment program.

Sections 1622:15 and 1622:25 of the Selective Service Regulations specify the conditions under which students pursuing programs of higher education may be considered for deferment. Within these specified requirements, students of the healing arts are considered for deferment in the same manner as students pursuing other undergraduate or graduate courses at colleges, universities, and similar schools.

Any student not previously deferred who is pursuing a full-time course of study is entitled to a single period of statutory deferment, class 1-S, until the end of the academic year. Such deferment does not preclude the possibility of later deferment in class 2-S. Students whose activity in study, research, medical, or other endeavors is found necessary to maintenance of the national health, safety,

or interest may be deferred in class 2-S until completion of their college training, provided they maintain satisfactory scholastic records. A student who is deferred for study extends his liability for military training and service up to his 35th birthday instead of his 26th, as prescribed for registrants who have never enjoyed a deferment.

In selecting a student for deferment in class 2-S, the Selective Service local boards may, at their discretion, be guided either by the score made by the student on the Selective Service College Qualification Test or by his record of academic performance. The college qualification test is given for the Selective Service System by the Science Research Associates, Inc., of Chicago. At present, in order to be eligible for deferment on the basis of this test, an undergraduate student must make a score of 70 or more. SSS Form 108 has been prescribed for furnishing to the local board the score made on this test. This score is confidential and may be divulged by the local board only to the registrant or to one holding his written consent.

To qualify for deferment on the basis of academic performance, the nonprofessional student must have maintained the following standing among the male members of his class: freshman year, upper one-half; sophomore year, upper two-thirds; and junior year, upper three-fourths. A student accepted for admission to medical school after July 1, 1951, for the class next commencing may be deferred, provided that, during his last full-time year at college or university, he was ranked among the upper one-half of the male members of his class or had a score of 70 or more on the Selective Service College Qualification Test.

A student accepted for admission by a graduate school after July 1, 1951, as a full-time student for the class next commencing may be deferred provided that, in his last full-time academic year in a college or university, he achieved a scholarship standing among the upper one-fourth of the male members of his class or scored 80 or more on the qualification test and provided that the graduate school certifies that he is meeting the degree requirements. Decisions concerning deferment of American students enrolled in foreign universities, including medical students, are the responsibility of the local boards. The local board may accept or reject any claims or evidence presented for deferment.

Status of Interns and Residents

The Selective Service System has always recommended the deferment of graduates of medicine to complete one year of internship training. Selective Service has stated that men, to be given favorable consideration for deferment to complete a residency or more than one year of internship, should be absolutely essential to the operation or maintenance of the hospitals where they are employed or that they be among those selected by the Assistant Secretary of Defense, Health and Medical, to participate in the Armed Forces Reserve Medical Officer Commissioning and Residency Consideration Program or by the Surgeon General of the United States Public Health Service and recommended for specialty training necessary in the staffing of hospitals of the Armed Forces or the United States Public Health Service. The Selective Service System is of the opinion that there is a sufficient number of young physicians who have satisfied their military liability or who are physically disqualified for military service to satisfy the requirements of the hospitals for residents and to provide for specialty training for civilian needs.

The Director of the Selective Service System has agreed to recommend to the Selective Service local boards the deferment of the men selected by the Department of Defense and by the United States Public Health Service, the latter not to exceed 300 as an over-all total for the Public Health Service. It is expected that these programs may be continued from year to year dependent upon the needs.

All young physicians participating in these programs must be commissioned in a Reserve component of the Armed Forces or the Public Health Service and agree to serve two years active duty following the completion of such training. The request for deferment is to pass from the individual to the Department of Defense, attention of the Assistant Secretary of Defense, Health and Medical, or the Surgeon General of the United States Public Health Service. Then, if recommended, it will be forwarded through national headquarters of the Selective Service System to the respective local boards of that system.

Those graduates of medicine who accept a commission in the medical corps reserve of an armed force will not be used, according to present Selective Service policy, to fill a regular call; therefore, such young men who are accepted in the Armed Forces Reserve Medical Officer Commissioning and Residency Consideration Program and who accept reserve commissions will be classified by their Selective Service local boards in a class indicating that they are members of the reserve forces. Should it become necessary for the Department of Defense to place with Selective Service a special call for doctors of medicine, such men will then be given consideration for deferment from active duty for such period of time necessary to complete their training.

A young physician who has established himself in a community where he has been found by his local board essential to the maintenance of an adequate medical service in that community may be deferred by his Selective Service local board or such a physician may be deferred for teaching, research, or Public Health work when these are considered by the local board to be essential in the national interest.

For the academic year 1958-1959, the Public Health Service has arranged certain research grants for students who have completed two years in

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medicine. These grants will be for one year, and the deferment of these special men will be requested by the individual registrant and recommended by the surgeon general, United States Public Health Service.

Status of Faculty Members

No policy has been announced by the Selective Service System on the granting of deferment to faculty members, except that teachers of medicine have been mentioned in a Selective Service Operations Bulletin as being in a critical occupation to which local boards should give special consideration. It has been recommended that as a general policy, essential members of the medical, dental, and veterinary faculties be held in their teaching positions until such time as replacements are found. This recommendation applies especially to persons in the basic science departments. This policy is not a blanket recommendation for deferment from military service for all teachers. Part-time teachers, who devote only a small portion of their time to teaching, will be expected to enter the military services. The President is also directed to establish a national advisory committee to advise the Selective Service System and to assist state and local advisory boards in selecting the needed medical, dental, and allied personnel.

Expiration of the "Doctor-Draft" Law

The August, 1957, issue (vol. 7, no. 8) of Selective Service carried a statement regarding the expiration of the "Doctor-Draft" law and the new legislative provisions for "Specialists' Service." Because of its importance from the standpoint of medical education as well as its implication in medical practice, this statement is presented in full in the following paragraphs.

"Doctor-Draft" Law Expires; New Legislation Provides for Specialists' Service

Amendments to the Universal Military Training and Service Act, as amended, adopted in June, 1957, replace the former "Doctor-Draft" law and provide for meeting the requirements of the armed forces for medical, dental, and allied specialists until June 1, 1959. Under the new amendments only those specialists who are otherwise liable as regular registrants are subject to induction under the Selective Service law.

The old "Doctor-Draft" law under which medical, dental, and allied specialists had been liable since 1950 expired July 1, 1957. It had placed liability for service on older doctors, dentists, and allied specialists, at one time up to the age of 51.

One of the principal effects of the new amendments to the basic Selective Service Law is to limit liability of doctors, dentists, and allied specialists to age 35 for those deferred on or after June 19, 1951, and to age 26 for others. Public Law 85-62, which amends the basic Selective Service Law with respect to these specialists, was signed by the President on June 27, 1957. By placing medical, dental, and allied specialists under the same provisions of law and regulations as other registrants with respect to the upper limit of the age of liability, the 1957 amendments relieve from liability under the Universal Military Training and Service Act, as amended, any such specialist over the age of 32 on the date the amendments became effective—July 1, 1957. This is true because in order to have acquired extended liability under the June 19, 1951, amendments, a registrant not only must have been deferred on or after that date but also must not have attained the 26th anniversary of his birth by that date. Any man who was 26 on June 19, 1951, would, on July 1, 1957, have been 32 years old.

The amendments in addition provide that:

1. No person in the medical, dental, and allied specialist categories shall be inducted if he applies for an appointment as a reserve officer and is or has been rejected for such an appointment on the sole ground of physical disqualification.

2. The President may order to active duty for not more than 24 consecutive months any member of a reserve component who is such a specialist, who is under 35, and who has not performed at least one year of active duty in the armed forces.

3. Any such person called or ordered to active duty from a reserve component of the armed forces, and who serves on active duty as a specialist for 12 months or more, shall on release from active duty or within six months be given an opportunity to resign the commission unless he is otherwise obligated to serve in active training and service in the armed forces or in training in a reserve component by law or contract.

4. Any physician or dentist qualified for a reserve commission shall, so long as need for his services exists, be given an opportunity to volunteer for active duty of not less than 24 months.

5. The President may prescribe rules and regulations for the selection or induction of persons by age group or groups and for the selection and induction of persons qualified in needed medical, dental, or allied specialist categories pursuant to requisitions submitted by the Secretary of Defense.

6. Qualified specialist aliens liable for induction shall not be held ineligible for appointment as commissioned officers solely on the grounds that such alien specialists are not citizens or have not declared their intention of becoming citizens.

7. Any qualified person who is liable for induction or who is ordered to active duty as a member of a reserve component as a physician, or a dentist, or in an allied specialist category, shall be appointed, reappointed, or promoted to such grade or rank as may be commensurate with his professional education, experience, or ability provided that any person in a needed medical, dental, or allied specialist category who fails to qualify for, or who does not accept a commission, or whose commission has been terminated, may be used in his professional capacity in an enlisted grade.

8. Periods of active duty performed by such specialists in student programs prior to receipt of appropriate professional degree or in intern training shall not be counted toward establishing the qualification of such specialists for classification as a veteran exempt from liability for training and service.

9. It is the sense of Congress that the President provide for deferment of optometry students and premedical, preosteopathic, preveterinary, preoptometry, and predental students in numbers at least equal to the numbers of such male students now studying in colleges and universities.

10. Public Law 62, 85th Congress, amending the Universal Military Training and Service Act, as amended, to provide service liability for persons in medical, dental and allied specialist categories, expired July 1, 1959, and was reenacted by Public Law 86-4, 86th Congress, and expires July 1, 1963.

With the expiration of the requirement for special registration of medical, dental, and allied specialists, such specialists under the amendments of June 27, 1957, should notify their local boards within 10 days of the attainment of degrees in these fields.

ARMY, NAVY, AND AIR FORCE PROCUREMENT PROGRAMS

The following information summarizing the Army, Navy, and Air Force procurement programs has been submitted by the office of the Assistant Secretary of Defense (Health and Medical), current to June 26, 1958. It has been prepared so as to present a general portrayal of current procurement programs in the medical branches of the armed services insofar as they concern undergraduate and graduate medical education.

ARMY

Early Commissioning Program for Medical Students

Medical students may apply for commissions in the grade of second lieutenant, Medical Service Corps, Army Reserve, while attending medical school. Students participating in this program will be obligated to accept superseding appointments in the grade of first lieutenant, Medical Corps, Army Reserve, on graduation and, in accordance with the needs of the active Army, may be required to serve on active duty for a period of two years on completion of internship. Persons appointed under this program are assigned to Ready Reserve Units in appropriate medical corps vacancies in TOE and TD troop program units, USAR Schools, and USAR Control Groups (Annual Training).

Every effort will be made to place officers commissioned under this program on active duty on a date desired by them; however, no assurance can be given that they will be ordered to active duty at a particular time, since such action is contingent on programmed requirements of the active Army.

Participation in this program will not in itself increase the active service liability or obligation of the participant. However, participants will be required to certify to their understanding that appointment prior to attaining age 26 incurs an obligation for active participation in the Reserve training unless excused under regulations prescribed by the Secretary of the Army.

Clinical Clerkship Training Program

Participants in the Clinical Clerkship Training Program will be medical students at the sophomore-junior and/or junior-senior level, who now hold appointments in the Medical Corps, Army Reserve, as lieutenants, or will be commissioned in sufficient time to participate in the program. A limited number may also participate in the program as "student employees" under Civil Service. Students in Army Reserve status who are selected for this clinical clerkship must volunteer to perform not more than 60 days of active duty for training, including travel. Students who are assigned to a USAR Control Group (annual training) and are selected for the clerkship will fulfill their annual requirement for active Reserve participation by performing the above period of active duty for training. The students who are assigned to a TOE or TD Reserve Unit, or a USAR School will perform this training "in lieu of" the annual unit training (summer camp) requirement with their unit.

The program will consist of approximately eight weeks of instruction at Army teaching hospitals, which will be devoted to military medicine and other military instruction, and the remaining time will be divided into two equal periods, one embracing internal medicine and its subspecialties, the other surgery and its subspecialties. A preventive medicine program will also be available and will include one week of general orientation in military organizations, its functions and procedures, followed by detailed observation and assistance in a comprehensive preventive medicine program. Research clerkships are also available in a limited number for selected individuals at several medical facilities.

The program commences on July 1 each year and is of 45-60 days duration. A student selected for a clerkship between his sophomore-junior year is not eligible to apply for the clerkship between his junior-senior year.

Senior Medical Student Program

Selected senior medical students will be commissioned as second lieutenant, Medical Service Corps, Army Reserve, and will be permitted to continue their studies in their respective schools as officers on active duty with full pay and allowances until they complete their academic requirements for the degree of doctor of medicine, or until completion of the academic year in which enrolled at the time of entry on active duty, whichever occurs earlier. On completion of their medical

education, selected students will be required to accept appointments in the grade of first lieutenant, Medical Corps, Army Reserve; they must agree to participate in the National Intern Matching Program, Incorporated, and serve on active duty for three years immediately following their civilian or military internship. This includes time obligated under the Universal Military Training and Service Act, if applicable. Participants who are not matched for an Army internship will be released from active duty for one year to allow them to complete a civilian internship, and they will then be recalled to active duty for three years at the end of the 12-month period.

Military Intern Program

Selected graduates of approved medical schools will be commissioned as first lieutenants, Medical Corps, Army Reserve, and will be ordered to active duty for the purpose of completing a 12-month internship in a military hospital. Individuals participating in the program will not incur obligatory service; however, those individuals who will be liable for military service under the provision of any law will be required to serve that obligation immediately upon completion of their internships. Military interns will be encouraged to apply for Regular Army and residency training.

Applicants must agree to participate in the official co-operative plan of internship appointments for first-year internships as conducted by the National Intern Matching Program, Incorporated.

Military Resident Program

The Military Resident Training Program is established for the purpose of providing the number of specialists required to meet the needs of the Army for career Medical Corps officers. Residencies are sponsored in both military and civilian hospitals.

Officers of the Regular Army Medical Corps and individuals who meet the appointment criteria for the Regular Army are eligible to compete for residency training. Although appointment in the Regular Army is not a requirement for appointment as a resident, the purpose of the program is to provide the Army with sufficient career personnel having the required specialty training. Accordingly, applicants will be considered on the following priority basis: (1) Regular Army Medical Corps officers, (2) Reserve Medical Corps officers on active duty, including interns who are concurrently applying for Regular Army appointment, (3) civilian physicians, including interns, who apply for Regular Army appointment, and (4) all other applicants.

Inasmuch as the number of applications received for participation in the Army residency program far exceeds the number of appointments available, consideration should be given to seeking a Regular Army commission in order to establish a priority for consideration for the residency program. Appointment for the program ordinarily will not be made more than one year in advance, and applications for Regular Army in connection with residency training will not be considered for appointment in a grade higher than captain. Individuals selected for training who have not completed the appropriate Army Medical Service orientation course, or an equivalent period of active duty as a medical officer, as determined by the surgeon general in each case, will be required to undergo such training prior to entering residencies. Selections will be made in November of each year. Appointments to fill remaining vacancies will be made from applications as received.

Individuals placed in residencies in Army hospitals will be required to serve one year on a duty status for each year of training received.

In the event training is not available in Army hospitals on the next starting date after approval of an application in a specialty that is critical to the needs of the Army, an opportunity will be offered to applicants approved for Regular Army to obtain such training in a civilian hospital approved by the Council on Medical Education and Hospitals of the American Medical Association. Individuals participating in the program in civilian hospitals under this policy are required to serve on active duty for two years for the first year of training received and one year for each subsequent year.

NAVY

The Ensign 1915 USNR Program

After passage of the Selective Service Act of 1940, many medical students who were obligated for military service by the Act indicated their desire to affiliate with the Naval Reserve in order to assure that their period of active duty would be with the Navy's Medical Department. To make this possible and to provide deferment from active duty until graduation, the Ensign, Probationary (Medical) Program was established before the onset of World War II. The first appointments late in 1941 were limited to third-year and fourth-year medical students attending class "A" (approved) medical schools. Within a few months, however, the program was expanded to include first-year and second-year medical students, and it has since come to be known as the Ensign 1915 Program.

The qualifications for appointment as Ensign, 1915, are as follows:

A. Sex: Men and Women

B. Age

(1) Candidates with no prior military service should be at least 19 and of such age that upon expected date of graduation, they will be under 33. The maximum age limit with prior active military service may be adjusted on a month-to-month basis, depending upon the number of months of active military service performed, but in no case to exceed 36 months. Applications cannot be accepted from any person who will have passed his or her 36th

birthday when he or she becomes eligible for superseding appointment in the Medical Corps, U. S. Naval Reserve following graduation from medical school.

C. Educational

(1) Should be within 120 days of completion of all academic work required for enrollment in medical school.

(2) Should be in attendance or have been accepted for and be within six months or less of the date of the next entering class at one of the American or certain of the Canadian medical schools accredited by the Council on Medical Education and Hospitals of the American Medical Association, including approved schools of the basic medical sciences in the United States and Canada. Applications cannot be accepted from students who will attend a medical school in a foreign country other than Canada.

(3) Should NOT have commenced the final year of medical school.

D. Professional

(1) Applicants are required to establish professional fitness and aptitude for the Naval Service through interviews and a review of college and employment records.

E. Physical Standards

(1) Should be found physically qualified for appointment to commissioned status in accordance with established regulations.

The primary objectives of this program are to provide (1) an opportunity for qualified medical students to affiliate with the Naval Reserve as commissioned officers while still in medical school; (2) assurance that these officers will be able to complete their medical studies and internship prior to fulfilling their obligation for active military duty; (3) assurance that, when they do enter the service, it will be within the Navy's Medical Department; and (4) a primary source of qualified candidates for the Naval Intern Program and for the Medical Corps of the Navy and Naval Reserve.

As an added incentive for membership in the Ensign 1915 Program, there has been established a 30-60 day active duty research clerkship training program at naval research activities throughout the United States. This program provides orientation and indoctrination into medical research as well as on-the-job training for the undergraduate medical student during his vacation from medical school. Full pay and allowances are authorized for these selected officers while so serving on active duty. Medical students who are commissioned as Ensign, 1915 USNR, and who have successfully completed the first year of medical school are eligible to participate in this program. Research clerkships offer a detailed review of the specific research program being conducted at the training activity. A part of the training is spent in each research department, and the trainee serves as an assistant in actual laboratory research on a specific project under way at that time.

Also established are clinical clerkships at Naval teaching hospitals throughout the United States. Beginning July 1 of each year, this program offers quotas for selected medical students who have completed the second year of medical school, 30 to 60 days of active duty for training during vacation from medical school. Clinical clerkships are planned to provide indoctrination and orientation into naval medicine, rotation through the major professional services of a naval teaching hospital, and performance of on-the-job training duties commensurate with the individual's professional attainments.

Normally each year during the summer months a limited number of mature medical students holding commission as Ensign, 1915, are authorized to participate in NROTC-Midshipmen Cruises. Selections for this important training are made from students who have completed at least their second year of medical school with priority being given those who have completed their third year. Trainees receive an excellent indoctrination and orientation into the practices of naval medicine aboard ship under the supervision of experienced medical officers of the Regular Navy and Naval Reserve.

To assist the medical student financially, and to attract future doctors of medicine toward a career in the Navy Medical Corps, the Senior Medical Student Program was authorized by the Secretary of the Navy. To be eligible for participation, the individual student must be an Ensign, 1915 USNR, or agree to accept such an appointment if selected. Further, he must have completed his third year of medical school and be eligible for enrollment in the ensuing year. During attendance in medical school, these officers serve on active duty, receiving the full pay and allowances of their rank. In return for participation in this program, the individual serves one year plus the 24 months obligated by the Universal Military Training and Service Act, as amended.

Here are some important facts concerning the Senior Medical Student Program:

(1) This program is open to qualified students enrolled at medical schools accredited by the Council on Medical Education and Hospitals of the American Medical Association. Students who have completed their second year of medical school may make application for this training at an Office of Naval Officer Procurement. Active duty commences and continues while in attendance during their senior academic year. To be eligible for participation, he must be an Ensign, 1915 U. S. Naval Reserve, or agree to accept such an appointment if selected. A board convened in the Bureau of Medicine and Surgery selects the candidates for participation in this program.

(2) Physical standards of this program are the same as those established for Regular Navy staff corps officers.

(3) Active duty orders are mailed to the student via the Professor of Naval Science or the District

Commandant. Active duty commences upon receipt of such orders and completion of proper reporting endorsements.

(4) The student agrees, in writing, to accept a Regular Navy commission, and if a Regular Navy commission is not tendered, to accept an appointment in the Naval Reserve.

(5) In accepting an appointment in the Regular Navy or Naval Reserve, as a result of having active service in the Senior Medical Student Program as an Ensign, 1915, he is obligated to serve on active duty and to retain the commission for a period of three years. This active service will commence upon completion of not more than 12 months of a civilian or Naval Internship. Providing that the student has 24 months obligated military service to perform, this active duty affords a splendid opportunity to discharge the military obligation and serve an additional year in return for the benefits received in the Senior Medical Student Program. With no obligated military service to perform, upon enrollment in the Senior Medical Student Program, the student obligates himself to serve for the same period of three years.

(6) As a medical student, he receives the full pay allowances of an Ensign, 1915, while so enrolled on active duty. Pay and allowances are based on longevity as follows:

(*a*) Less than two years and no dependents, he receives $338.58 per month; with dependents (a member of his family or household dependent upon him for financial support) he receives $355.68 per month.

(*b*) Over two but less than three years and no dependents, he receives $366.28 per month; with dependents, he receives $384.38 per month.

(*c*) Over three and no dependents, he receives $429.28 per month; with dependents he receives $447.38 per month.

(7) In addition to the pay and allowances, the student is credited with 2½ days of annual leave for each 30 days of active duty served.

(8) The wearing of the Naval uniform is permitted only when authorized by appropriate naval authority.

(9) Timing is very important. An average of four months is required to completely process each application. Feb. 1 each year is the absolute deadline that completed applications must be forwarded to the Bureau of Naval Personnel, Navy Department, Washington, D. C. This is necessary so that sufficient time is given to the board in the Bureau of Medicine and Surgery to pass on the professional qualifications and the board in the Bureau of Naval Personnel to pass on the over-all qualifications of each applicant. Those selected are required to meet the moral, mental, and physical standards of Navy acceptance. All applicants will be notified by individual letter of their acceptance or rejection not later than the first week in May.

Naval Internships

Naval internships are 12 months in duration, are rotating in type, and conform in all respects with the requirements of the Council on Medical Education and Hospitals of the American Medical Association. These compare most favorably with the best civilian internships, and each year the number of applicants considerably exceeds the number of available naval internships. Internships are offered at the U. S. Naval Hospitals located at Camp Pendleton, Calif.; Oakland, Calif.; San Diego, Calif.; Jacksonville, Fla.; Pensacola, Fla.; Great Lakes, Ill.; Bethesda, Md.; Chelsea, Mass.; St. Albans, N. Y.; Philadelphia; Newport, R. I.; Charleston, S. C.; Portsmouth, Va.; and Bremerton, Wash.

All naval interns are selected and matched to the Navy by the National Intern Matching Program, Incorporated. It is not necessary for the medical student to be a participant in the Ensign 1915 USNR Program in order to apply and be accepted for a naval internship. On the other hand, if the Ensign 1915 USNR candidate does not desire a naval internship, he should list only the civilian hospitals in the order of his preference, and in this way he will not be competing with those who desire a naval internship and who request to be so matched. The Ensign 1915 candidate who is matched to a civilian internship will be placed on inactive duty during the period of his internship, following completion of which he will be called to active duty in compliance with his previous service agreement.

The basic requirements for a naval internship include the following: (1) be a graduate or potential graduate of a medical school approved by the American Medical Association; (2) be a citizen of the United States; (3) be registered with and his name appear in the Official Directory of Students published by the National Intern Matching Program, Inc.; and (4) meet the prescribed physical standards for a commission in the U. S. Naval Reserve.

In order to become eligible for consideration for a naval internship, candidates must first make application for a commission in the Naval Medical Corps. This can be accomplished by visiting or writing to the nearest Office of Naval Officer Procurement or the nearest U. S. Naval Hospital in the continental United States. In applying for a naval internship it is recommended that five (5) naval hospitals be listed in the order of preference. Generally assignments are made from among the first three listed. The candidate applies, as far as the matching is concerned, directly to the Navy and not to the specific hospital. If matched to the Navy, every effort is made to place the candidate in his first choice, but if this is not possible, he will be assigned to another hospital of his choice. In the matching program the student is matched to the service and not to a particular hospital within it.

Applications for commission in the Naval Medical Corps for intern training are accepted between Sept. 1 and Dec. 1 each year. That portion of the application pertaining to internship is accepted between Oct. 1 and Dec. 1. Early submission of applications is strongly recommended.

Any additional information may be obtained from the Chief, Bureau of Medicine and Surgery, Department of the Navy, Washington 25, D. C.

Naval Residency Training Programs

Eight U. S. naval hospitals are now approved for residency training in the various clinical specialties of medicine and surgery by the Council on Medical Education and Hospitals of the American Medical Association and by the respective American Specialty Boards. These naval hospitals are located at Chelsea, Mass.; St. Albans, N. Y.; Philadelphia; Bethesda, Md.; Portsmouth, Va.; Great Lakes, Ill.; Oakland, Calif.; and San Diego, Calif. Residency training for medical officers is also actively sponsored by the U. S. Navy in selected outstanding civilian hospitals, schools, and medical centers of the United States in those few specialties wherein the Navy does not operate formalized training programs. U. S. Naval Hospital residency training activities embrace the specialties of anesthesiology, cardiovascular disease, dermatology and syphilology, general practice, internal medicine, neurology, obstetrics and gynecology, ophthalmology, orthopedic surgery, otolaryngology, pathology, pediatrics, psychiatry, radiology, surgery, thoracic surgery, and urology. Formally approved training in civilian institutions is conducted in allergy, plastic surgery, neurological surgery, preventive medicine and public health, and in children's orthopedic surgery.

Medical officers eligible for assignment to duty as a resident are Regular Navy officers and those Reserve medical officers who are willing to accept and can qualify for a commission in the Regular Navy. Requests for residency training duty should be forwarded to the Chief of the Bureau of Medicine and Surgery, Navy Department, Washington 25, D. C. All such requests are acted upon by the Bureau Advisory Board on professional training matters. This board makes recommendations in accordance with the merits of each case, taking into consideration the professional experience, background, and aptitude of the candidate and the needs of the service in the particular specialty in which training is desired. One year of obligated service is required for each year of training received in a Naval hospital. Two years of obligated service are required for the first year of training received in civilian institutions and one year of obligated service for each successive year so spent.

It is the policy of the Bureau of Medicine and Surgery to continue a resident in training until formal requirements, leading to eligibility to undergo examination by an American Specialty Board, have been met. This procedure will be strictly adhered to in every case where the needs of the service permit, barring national emergencies, provided that such an arrangement remains mutually agreeable and satisfactory aptitude and progress as a resident are demonstrated. The highest priority in the assignment of naval medical officers to residency training is given those who have completed or are about to complete a normal tour of active duty with an operational unit of the U. S. Navy at sea or on foreign shore stations.

Other Graduate Training for Naval Medical Officers, Including the Military Medical Specialties

Aviation Medicine.—The School of Aviation Medicine at Pensacola, Fla., convenes three classes annually of approximately 40 students, for didactic instruction in aviation medicine and actual instruction in flight and ground school. Each class is of about six months duration. On completion of this course of instruction they are designated naval flight surgeons and assigned to a two-year period of operational duty. Additionally, the School of Aviation Medicine is approved for residency training in aviation medicine. This training may be requested after completion of the two-year operational duty assignment and consists of one year of public health at a civilian institution and two years of residency training in aviation medicine at the school in Pensacola or any of the approved aviation research laboratories. They are then considered board eligible for certification in aviation medicine after another two-year operational tour. Further opportunities are available in several large naval laboratories for work in research related to aviation medicine. The laboratories are located at Johnsville, Pa.; Philadelphia; the School of Aviation Medicine, Pensacola, Fla.; and the Naval Medical Research Institute, National Naval Medical Center, Bethesda, Md. A medical officer interested in the aeronautical aspects would do well to consider this advanced training.

Submarine Medicine.—This military medical specialty supports all phases of underwater operations in the Navy. Training in this specialty is particularly applicable to those having an interest in occupational medicine, public health, radiobiology, or research. The basic six months' course of training includes lectures, demonstrations, laboratory work, practical experience, and cruises in submarines, rescue vessels, and tenders as available. The major part of the course is given at the Submarine School and Medical Research Laboratory at the Submarine Base, New London, Connecticut.

On completion of the first four months, two alternatives are available to the student. During the last eight weeks he may elect to either take a course in radiobiology or underwater physiology.

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The course in radiobiology is taught at the Nuclear-Power Division of the Submarine School. The subject matter embraces the essentials of nuclear physics, nuclear engineering, health physics, and the biological effects of radiation. Medical officers who complete this course will be assigned to duty with the Nuclear Power Submarine Program.

The course in underwater physiology is taught at the U. S. Naval Deep Sea Diving School, Naval Weapons Plant, Washington, D. C. Here the student learns about the physiological problems involved in diving and underwater swimming. He also learns about diving by completing deep sea diving exercises. The course also covers the recognition and treatment of pathological conditions resulting from exposure to high atmospheric pressures. Those completing this course will be assigned duties with conventional submarine squadrons or operational units employing divers and underwater swimmers.

Career medical officers will be provided with an opportunity for cross-training at a later date. That is, they may complete the course, radiobiology or underwater physiology, they did not elect in the basic training program.

On completion of a tour of duty with an operational unit the medical officer may apply for postgraduate training in various fields. He may prepare for certification in preventive medicine by attending one of the public health schools and subsequent field duty ashore and afloat. He may prepare himself for a career in research by a postgraduate year at the University of Pennsylvania College of Medicine followed by duty at naval laboratories and with operational units. Clinical medical specialty training in all fields is available and having served with an operational unit adds weight to one's application.

Research Program.—The Navy offers medical officer billets for military medical research careers. These opportunities embrace basic medical research in aviation medicine, submarine medicine, clinical specialties, amphibious and field medicine, tropical and exotic diseases, and in the areas of the medical problems of nuclear, biological, and chemical warfare defense. These billets are distributed among 15 in-service laboratories, strategically located throughout the world, and represent the program indicated above.

Amphibious and Marine Corps Field Medicine.—Recognized as an important military operational medical specialty, this training is conducted at Camp Lejeune, N. C., Camp Pendleton, Calif., and the Marine Corps Educational Center, Senior School, Quantico, Va. This specialty offers valuable training in the methods of sorting (triage), management, and evacuation of mass casualties, research and development of field medical equipment, field sanitation methodology and practices, medical logistic support, large scale medical planning, and efficient patient care in field combat.

Nuclear Medicine.—Graduate courses for medical officers are conducted at several U. S. Naval Hospitals, in affiliation with civilian institutions. Additional graduate courses in radiobiology are sponsored by the Navy for medical officers at Reed College, Portland, Ore., and the University of Rochester, Rochester, N. Y., to meet present and future needs of the Navy for personnel trained in the fields of nuclear propulsion, radiological safety and special weapons effects. Formal long courses for radiology and other residents are conducted in the clinical use of radioisotopes at the U. S. Naval Medical School, National Naval Medical Center, Bethesda, Md. This latter course is approved by the Atomic Energy Commission and is designed to fulfill the needs of those who wish to appear for future examination for certification by the American Board of Radiology, as well as those residents in other specialties who may need to acquire a better understanding of the clinical utilization of radioisotopes in diagnostic and therapeutic procedures.

AIR FORCE

The Air Force presently conducts the Senior Medical Student Program, as well as Sponsored Internships and Residencies in military and civilian hospitals. Applicants must be United States citizens, be morally, physically and educationally qualified, and must not be nor have been conscientious objectors. Complete details on any of the following programs may be obtained by writing to the Surgeon General, United States Air Force, Washington 25, D. C.

The Senior Medical Student Program

The Air Force Senior Medical Student Program is available to Junior Medical Students. The application period for this program is Nov. 1 to March 1 of the student's junior year. Those selected are commissioned as Second Lieutenants and are called to active duty about Sept. 15. Selected applicants agree to accept reappointment as First Lieutenants on graduation and to apply for a sponsored internship, either military or civilian. Those not selected for sponsored intern training are released from active duty for one year to intern under private contract. Selected applicants incur a three-year obligation, which must be served immediately upon completion of internship. No additional obligated service is incurred through the combination of the student program and either of the intern programs. Tuition, books, and other related expenses must be paid for by the student.

Air Force Sponsored Military and Civilian Internships

The Air Force Intern Training Program, begun in 1950, is designed as a Regular Officer Procurement Program. To be considered, applicants must meet general eligibility requirements stated above, must not be more than 32 years of age, and must be

graduates of medical schools acceptable to the Surgeon General. Selections are made on the basis of scholastic standing, physical fitness, and military aptitude and inclination.

Military Internships

For the year beginning July 1, 1960, the Air Force will sponsor ninety-two (92) interns in military hospitals, selected through the National Intern Matching Program. Interested students must submit their applications to the Surgeon General, United States Air Force, not later than Dec. 1, 1959. Selectees are appointed First Lieutenants, Reserve of the Air Force (Medical Corps), and agree to serve on active duty for three years including the year of internship. This concurrently satisfies the individual's obligation under the Universal Military Training and Service Act. In applying for an Air Force internship, it is recommended that five Air Force hospitals be listed in the order of preference. Generally assignments are made from among the first three listed. Internships are of one year duration and are of the general rotating type. Training is directed by military and civilian physicians and includes a wide range of clinical material, using modern medical, surgical, and radiological facilities. It fully satisfies the requirements of the Council on Medical Education and Hospitals of the American Medical Association.

Civilian Internships

For the year beginning July 1, 1960, the Air Force will sponsor approximately 80 interns in approved civilian hospitals. The application period for internships commences on July 1, closes on April 1 of each year. Applicants for off-term internships should apply approximately six months prior to the starting date of the training. Selected applicants serve on active duty as First Lieutenants, Reserve of the Air Force (Medical Corps), and must agree to serve for a total of four years, including the year of internship. This concurrently satisfies the individual's obligation under the Universal Military Training and Service Act.

Residency Training Program

This program is designed to provide competent, well-trained career officer specialists for responsible positions in Air Force medical facilities. Participation is normally limited to members of the Regular Air Force with outstanding qualifications who are genuinely motivated for careers in the Air Force. Physicians accepted for the program are trained in Air Force, Army, and civilian hospitals (including nonmilitary Government hospitals). For the year beginning July 1, 1960, the program provides for a maximum of 375 residents, about equally divided between military and civilian hospitals. Approximately 120 first-year residency spaces are available; 40 in Air Force hospitals, 30 in Army hospitals, and 50 in civilian hospitals.

Training is available in the recognized medical specialties according to the needs of the Air Force. Competition is keen since many more applications are usually received than may be approved. The chances of an applicant for acceptance are naturally better if he desires training in a specialty in demand. The Air Force needs specialists in psychiatry, neurology, general practice, otolaryngology, radiology, gastroenterology, and infectious diseases.

The USAF Hospital Lackland, Lackland Air Force Base, San Antonio, Texas, a new teaching hospital of the Air Force, offers approved residency training in anesthesiology, general surgery, internal medicine, obstetrics and gynecology, ophthalmology, orthopedic surgery, pathology, pediatrics, radiology, and urology. These programs normally commence on July 1.

Physicians who enter this program are expected to remain in training until they have completed the minimum formal training requirements of the specialty boards, provided that progress is satisfactory. Applications for a Regular Air Force commission and residency training may be initiated simultaneously and at any time following the beginning of the internship. The Air Force Medical Service prefers to select residents from among those highly qualified physicians who have had an opportunity to observe the practice of medicine in the Air Force. A period of active duty permits the individual to evaluate the service from a career viewpoint. It also affords the Air Force an opportunity to evaluate the performance of the individual in terms of his suitability and adaptability for a career in Air Force medicine.

Normally, approximately six or more months are required to process the applications for a Regular Air Force commission and residency training. It is recommended, however, that the applications be submitted in August or September for training to begin between the following July and January. Such applications must reach Headquarters United States Air Force not later than Nov. 15.

The USAF Aviation Medicine Specialty Training Program leading to board certification in Aviation Medicine is a comprehensive program of five years' duration. Applicants must be graduates of the Primary Course of Aviation Medicine and have had a minimum of nine months practice as an Aviation Medical Examiner. Applicants must be officers of the Regular Air Force, physically and professionally qualified, and be no more than 34 years of age when the class convenes. Applications must arrive at Headquarters United States Air Force not later than Jan. 1 for entrance into program beginning the following September.

Further information pertaining to the program, including the application procedures, may be obtained from the Chief, Medical Education Division, Office of the Surgeon General, USAF, Washington 25, D. C.

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UNDERGRADUATE AND GRADUATE MEDICAL TRAINING PROGRAMS IN THE VETERANS ADMINISTRATION

The following material reviewing the Undergraduate and Graduate Medical Training Programs in the Veterans Administration has been submitted by the Director, Education Service, Department of Medicine and Surgery of the Veterans Administration.

The Veterans Administration–Medical School relationship continues to provide the basic medium for undergraduate and graduate medical training in VA hospitals. Confidence in the principles of this association and acceptability of the current working relationships has been strongly reaffirmed by a letter survey of opinions from all VA hospital managers and deans of associated medical schools. The results of this survey were published in the *Journal of Medical Education*.[20]

As of May 30, 1959, there were 2,669 physician residents on duty, of whom 265 were in career status. Those in the latter group receive the pay of full-time physicians in return for a specified period of assigned service at the conclusion of their residency training. The career residents were distributed in six specialty groups as shown in table 48.

Due to a temporary suspension of reporting in 1959, exact data are not available for the distribution of noncareer residents by specialty or for the number and administrative type of programs in operation during this year. We will resume the reporting of these data in the next year.

TABLE 48.–*Veterans Administration Career Residents, May, 1959*

Anesthesiology	23
Neurology	12
Pathology	24
Physical Medicine	25
Psychiatry	157
Radiology	24
Total	265

The assignment of medical students to Veterans Administration hospitals for clinical clerkship training has continued at a level approximating that for the previous academic year. A numerical survey was not made for the year 1958-1959.

Foreign Medical School Graduates

During the academic year 1958-1959, 194 noncitizen residents were assigned to VA programs for limited periods of service averaging slightly less than five months. Of these, 171 served on a "without compensation" basis by assignment from university hospitals. Twenty-three were employed under contract privileges which are currently extended to noncitizens who are graduates of approved Canadian or American medical schools.

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A HISTORICAL NOTE ON THE ANNUAL REPORTS ON MEDICAL EDUCATION

WHEN the Council on Medical Education and Hospitals was formed in 1904 as a standing committee of the American Medical Association, one of the three general responsibilities it was charged to assume was "To make an annual report to the House of Delegates on the existing conditions of medical education in the United States." The report of the Council which appears in this issue of THE JOURNAL is in response to this early charge. However, the current report is the 59th of the series which obviously had its beginning prior to the formation of the Council.

The first Educational Number of THE JOURNAL appeared in 1901. Whether this was due to the interests and efforts of the Committee on Education which preceded the Council or was an independent venture of the editorial staff is not now clear. The initial report contained descriptive paragraphs which summarized the information found in the catalogs of 158 medical schools and presented statistical data in two tables. One was entitled "Medical Colleges of the United States," which portrayed for each school such matters as the numbers of students registered, the number of graduates and teachers, and the physician population ratio in the states concerned. The second table gave the geographical source of students enrolled.

Fourteen pages of the issue were devoted to a discussion of matters related to medical education. These matters were considered under such titles as: "University Work in Medicine," "Research Work for Undergraduates in Medical Schools," "Independence of Study and Thought in Medical Education," "The Elective System in the Medical School," "Value of the Fundamental Branches," "Changes in our Medical Schools Necessary to Meet Modern Conditions," and "The Medical College Association and Their Influence on Higher Standards of Medical Education."

The reader of the 59th Annual Report and other recent writings on medical education perhaps will share Whitman's thought quoted from his "Passage to India"—

> The past! the infinite greatness of the past!
> For what is the present after all, but a growth
> out of the past?

AN OPEN-ENDED MEDICAL EDUCATION

Many physicians are familiar with experiments in medical education which are designed, in part at least, to break the barrier that has traditionally existed between colleges and schools of medicine. The Hopkins experiment which went into effect this fall is but one example of several that either are planned or have been implemented. These programs allow selected students at the end of the second or third college year to begin medical school studies while at the same time continuing liberal arts college courses. Such experiments are being watched with interest, for they embrace the advantages not only of relating the medical school faculty and students more closely to the parent university but also of shortening by one year the formal educational span in medicine.

This effort to present medical study as a continuum of liberal arts study rather than to view each as separate segments, and on occasion as necessary hurdles, appears to be a principle that may be more widely applicable. Traditionally, education in medicine has been viewed as a series of distinct steps, i. e., college premedical study, medical school, internship, and residency training. Whether or not it will be possible to merge a part of college and medical school studies is dependent on the attitudes and actions not only of medicine but also of higher education in general. Medicine can, largely within itself, work toward a blending of all formal medical education.

There is a real unifying thread that binds together the segments of medical education beginning with the clinical clerkship in the third medical school year and running through the internship and residency programs. Throughout these various steps, there are the common and continuing objectives of providing students the opportunity to acquire clinical knowledge, skills, aptitudes, experience, wisdom, and judgment. The significant difference between the clerk, intern, and resident is largely one in degree of knowledge, skill, experience, and judg-

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ment which is reflected in the amount of responsibility delegated to the clerk, intern, or resident for patient care.

Viewed from this perspective, it is logical that the total clinical educational program should be constantly in mind as any of the stages within it are designed. Under these circumstances, each step can be planned to place particular emphasis where it should most logically rest. The clerkship could be fully developed to provide the student with a depth of knowledge of how clinical problems are rationally approached and resolved in the various clinical disciplines. The student could also acquire a beginning understanding of the particular diagnostic and therapeutic competences, techniques, and tools peculiar to major clinical disciplines. The depth of knowledge accompanied by only beginning responsibility for patient care at the student clerkship level would be replaced in the succeeding levels of internship and residency by greater breadth of knowledge and experience and greater patient responsibility.

By opening the early years of medical school study to allow for concomitant learning of college and medical disciplines, it is hoped that the two may better augment one another. It seems reasonable to expect that by opening the later years of medical school so that they may influence and be influenced more easily by the succeeding years of internship and residency, similar benefits may be obtained.

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AMERICA'S RESPONSIBILITY TO THE FOREIGN MEDICAL GRADUATE

The recent Second World Conference on Medical Education, held under the auspices of the World Medical Association in Chicago, August 30-September 4, 1959, afforded the opportunity for discussion with leading medical educators from many nations. That the medical profession throughout the world looks toward the United States for leadership and assistance has been an important factor in bringing so many graduates from foreign medical schools to the United States for graduate medical education and training experiences during recent years.

Although some of the graduates of foreign medical schools have enjoyed excellent opportunities during their graduate medical education assignments in the United States, disappointment has been expressed by many others. There appear to be three general reasons why many foreign graduates have found their experiences disappointing, and even frustrating.

Many a foreign medical graduate has come to the United States to serve an internship in which he expected to obtain further education, but found that his real assignment was for basic service. Many a foreign medical graduate has found that whatever educational aspect was included in his program was a veneer so thin as to be almost nonexistent. The interest and concern of the hospital administration and of the professional staff in the service functions of the intern in such instances, and their feigned or almost complete absence of sincere interest or recognition of their responsibility to the foreign graduate, has been a genuine disappointment for many a young physician. Although this situation has been improving in recent years with the appointment of directors of medical education in many hospitals which are not integrated with teaching institutions, there is still much to be desired, in general. A hospital staff or administration that appoints foreign medical graduates should accept and be prepared to meet, because of the varied educational backgrounds and partial language barriers, an educational challenge even more demanding than that presented by graduates of our own schools.

The Educational Council for Foreign Medical Graduates now makes it possible to screen such persons prior to their house staff appointments. It will evaluate their medical credentials and test their knowledge of medicine and their command of English. Certification by the Educational Council for Foreign Medical Graduates will indicate that, on the basis of this screening, the individual possesses the background knowledge considered essential for appointment as an intern in a hospital approved for such graduate medical education. Thus the hospital administration and its professional staff now have a mechanism that should eliminate some of the inadequately prepared foreign graduates who have been accepted in the past and who, in some instances, were unable to benefit from their opportunities. However, with this mechanism the hospital administrators, boards of trustees, and professional staffs should recognize their responsibility and challenge to offer the foreign graduate whom they accept an educational experience worthy of American medicine and one that will serve him well when he returns to his own country.

A second cause for disappointment was expressed on the part of some who had received resident or fellowship appointments in some of the well-known teaching centers. Although some had enjoyed thoroughly excellent experiences, others had found that they were just part of a crowd. This latter group found that they were always on the periphery, looking on but never really participating. Participation in such instances seemed to be centered around the few favored persons who were destined to climb the pyramid to its apex. Highly competent foreign graduates have found this a disillusioning experience. Many of the graduates of our own schools have had similar experiences, so that this type of

disappointment has, by no means, been restricted to foreign graduates. On the other hand, if our institutions and our educators in graduate medicine are to accept foreign physicians for such advanced education and training, it would appear that they have an obligation and challenge to afford these physicians the kind of opportunity that is meaningful and not just a grandstand side-line view. This general problem suggests the need for review of the current top-heavy graduate education program in some of our institutions.

The remaining cause for disappointment has been expressed by the foreign physician who has taken his complete graduate medical education and training in one of our approved residency programs and then found, in some instances, he was ineligible to be certified by the American specialty board concerned. A number of specialty boards currently admit properly qualified foreign medical graduates to their examinations with subsequent certification. However, well over half of the specialty boards have as eligibility requirements that the candidate should be a graduate of a medical school approved by the Council on Medical Education and Hospitals of the American Medical Association or that he should be a citizen of the United States. While this is sound policy for American citizens, it can almost nullify the possibility of certification of the foreign medical graduate. Such eligibility requirements have, therefore, made it impossible for some highly trained and otherwise completely qualified persons to obtain evidence, through American specialty board certification, of graduate educational experiences in the United States.

In times like these, when international understanding and cooperation are of paramount importance, it would appear highly desirable that restrictions of this type be given careful reconsideration. After all, the true function of a certifying agency, whether it be an American specialty board in the field of medicine or in some other area, should be the evaluation of the individual for competence in the field concerned and not concern with all of the details as to just how this competence has been developed. It is recognized that this latter contention may meet with difference of opinion, but from the objective point of view it would appear that some of the specialty boards are currently far too deeply involved in the details of the graduate educational experience and not sufficiently concerned with the total qualifications of the individual physician.

Has the time not arrived when all of the American specialty boards can, through the Advisory Board for Medical Specialties, reach a common agreement in regard to basic eligibility of the fully qualified foreign physician who has completed his specialty preparation in the United States? Such an agreement would remove one of the current barriers to international cooperation in the field of graduate medical education. It would make it possible for the well-qualified foreign physician to return to his homeland with the evidence he needs and should be privileged to enjoy. After all, a specialty certificate is not a license to practice but, rather, evidence of proficiency in a given field. This is an immediate challenge and sincere effort should be made to meet it.

THE BALANCE BETWEEN RESEARCH AND TEACHING IN MEDICAL SCHOOLS

All institutions of higher learning have in common the obligation to transmit and advance knowledge. The acceptance of dual responsibility of teaching and research in medical schools has posed in itself no serious problem, but the relationship between the two functions is not always as secure and comfortable as it should be. This has been particularly true in recent years, during which the ready availability of research funds has fostered great interest and growth in research activity.

Discussions about what constitutes a proper balance between these functions sometimes appears to indicate a belief that at worst research and teaching are antagonistic or at best that they are unhappy bedfellows. When these apparent beliefs are explored almost invariably they are denied, but still the controversy continues.

The attributes of critical intelligence, imaginative curiosity, controlled compassion, and a persistent will to find solutions to problems are equally basic and valuable to good students, teachers, investigators, and practitioners. The more of these separate identities that are merged into one individual the better will he perform his chosen task. Under these circumstances it would seem most natural that research and teaching should complement and strengthen one another.

In visiting many medical schools, one is impressed that this expected situation does not inevitably prevail. Initially it is not difficult to become convinced that the complementary relationship tends to suffer as the research effort of the school acquires bigness. Further experience makes it evident that the major factor is not the amount of research, the size of the grants or their sources, nor the number of investigators involved but rather the attitudes and interests of the faculty members responsible for the research which determine whether it shall complement and strengthen or dilute and weaken the teaching program.

As has been stated elsewhere research is one component of good teaching balance. Selection of faculty members capable of and dedicated to the

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two medical school obligations of teaching and research can assure that a favorable balance will be achieved.

MEDICINE'S GROWING DEPENDENCE ON ALLIED SCIENTISTS

The important role of the Ph.D. scientist as teacher and investigator in the basic medical sciences has long been recognized. Data presented by the Council on Medical Education and Hospitals in its current report indicate that almost 70% of full-time faculty members in the five major basic sciences do not hold the M.D. This represents a considerable decrease in the number of physician teachers in departments of anatomy, biochemistry, microbiology, pharmacology, and physiology since a similar analysis by Hinsey in 1950.[1] The greatest concentration of physician teachers in these subjects is in the most senior academic ranks so that the trend already clearly evident can be expected to continue.

The diminishing role of the physician in the basic science departments would be of serious consequence if it indicated that today's students have lost the opportunity to relate these disciplines to current clinical problems. There are three safeguards against this consequence: (1) the free interchange and easy communication that generally exist between basic science and clinical faculty; (2) the perceptiveness of students within whose minds the correlation of basic and clinical phenomena ultimately must take place; and (3) the increasing segment of career clinical teachers who have a sound background in one or more of the basic medical sciences as a necessary qualification for their own teaching and research.

Of even greater moment than the clinical orientation of these disciplines is that fundamental principles of the disciplines themselves, whether or not of current clinical significance, become a part of the student's knowledge. The important principles rather than facts of present clinical applications will provide the basis for understanding of future developments.

The impressive pace of medical advance gives ample proof that medicine's dependence on Ph.D. colleagues is well placed. The future will see an increase in the inherent interdependence of medicine and related sciences. The challenges posed will be met best as the relationships among all concerned continue to grow in mutual understanding and respect. The future will hold opportunities for increasing interdependence between medicine and related sciences and the rewards will be greatest as the relationships continue to grow in mutual understanding and respect.

1. Hinsey, J. C.: Maintenance of Continuing Supply of New Faculty Members (Presidential Address) J. A. Am. M. Coll. 25:379-395 (Nov., pt. 1) 1950.

MEDICOLEGAL INVESTIGATIONS

In THE JOURNAL September 1, 1956, page 40, under the heading Medical Examiner Versus Coroner System, a report was made of the then current legislative attempts to establish state medical examiner systems or to improve existing coroner systems. In 1954 the National Conference of Commissioners on Uniform State Laws approved a "Model Post-Mortem Examinations Act," which was the collaborative effort of the American Medical Association, the American Bar Association, the American Academy of Forensic Sciences, the American Judicature Society, the National Municipal League, and the National Civil Service League. At the time of the last report, the model law, or provisions similar to it, had been adopted in Massachusetts, Maryland, Virginia, Arkansas, Rhode Island, North Carolina, Georgia, Vermont, Louisiana, and parts of other states.

Since 1956 there has been considerable legislative activity but there have been relatively few enactments. Proposals patterned after the "model act" were introduced in many states but enacted in only one, Oregon, in 1959. According to a recent release of the National Municipal League relating to 1959 legislation in this field, the Oregon law creates a chief medical examiner in the state board of health and makes existing county or district health officers medical examiners. In other states: Iowa abolished the office of county coroner; Illinois created a centrally controlled autopsy service; Indiana created a Commission on Forensic Sciences; and North Carolina established a state toxicological laboratory. Qualified medical examiners have replaced elective coroners in parts of Florida, Michigan, New York, North Dakota, Pennsylvania, and Texas.

Many of the proposals that have been considered by the legislatures have been introduced and supported by local physicians and state medical society legislative committees. They are to be congratulated for giving their time in the interests of improving the quality of medicolegal investigations. It is to be hoped that the National Municipal League will continue its excellent work of acquainting legislators with the provision of, and need for, a model postmortem examinations act.

CHANGE OF ADDRESS

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MEDICAL NEWS

CALIFORNIA

Veterans Honor Dr. Geiger.—The National Commander of the Regular Veterans Association bestowed on Dr. Jacob C. Geiger, San Francisco, the Distinguished and Meritorious Service Ribbon and Gold Star in San Francisco, Oct. 28. The citation reads as follows: "For Valuable Medical and Public Health assistance rendered specifically to Veterans, over the many years; for services to this and other countries of the world and for being an outstanding citizen and public official."

DISTRICT OF COLUMBIA

Annual Scientific Assembly.—The Medical Society of the District of Columbia will hold its 28th annual scientific assembly Nov. 23-25 at the Statler-Hilton Hotel, Washington, under the presidency of Dr. W. Leroy Dunn, who will open the meeting. The program is arranged as a schedule of 19 panel discussions. A clinicopathological conference the afternoon of Nov. 25 will be moderated by Dr. Louis B. Thomas, Seattle, head, surgical pathology and postmortem service, National Cancer Institute. A film-reading session is planned for the afternoon of Nov. 24, moderated by Dr. Fred O. Coe, chief of staff, Doctors Hospital, Washington. There is no registration fee. A society luncheon is planned for Nov. 23. Scientific and technical exhibits and motion pictures are planned.

INDIANA

State Medical Election.—Officers of the Indiana State Medical Association for 1959-1960 elected at 110th annual convention are: president-elect, Dr. Guy A. Owsley, Hartford City; treasurer, Dr. Okla W. Sicks, Indianapolis; assistant treasurer, Dr. Harry Pandolfo, Indianapolis. Delegates to the American Medical Association for a term ending Dec. 31, 1961, are Dr. Gordon B. Wilder, Anderson, and Dr. Wendell C. Stover, Boonville. Dr. Earl W. Mericle, Indianapolis, elected president-elect in October, 1958, was installed as president for 1959-1960.

MARYLAND

Dr. Heller Receives Cytology Award.—The Wien Award for 1958 was presented to Dr. John R. Heller, Bethesda, at a citation dinner Nov. 7. Each year, the Wien Award is presented to the scientist whose work or projects represent "outstanding research in cancer cytology." Initiated in 1953 by Leonard A. Wien, past-president of the Cancer Institute at Miami, the award consists of $1,000 and a bronze plaque. The first Wien Award was conferred on Dr. George N. Papanicolaou, New York City. Dr. Heller is director of the National Cancer Institute of the U. S. Public Health Service and earlier this year was appointed head of the cancer control section of the International Union Against Cancer.

Library of Health Sciences.—Construction of the new Health Sciences Library on the Baltimore campus of the University of Maryland is nearing completion. The library, which will be ready for occupancy early in 1960, will serve the schools of dentistry, medicine, nursing, and pharmacy as well as University Hospital. The new million-dollar library consists of three stories and a basement. It will have space for 200,000 volumes, a study seating capacity for 400, and an auditorium that will seat 400. There will be individual study carrels, group study rooms, and faculty studies, in addition to the larger reading rooms. Historical collections of the four schools will be placed in a special room, arranged to show the development of each field separately.

Health Sciences Library on Baltimore Campus of the University of Maryland nears completion.

Physicians are invited to send to this department items of news of general interest, for example, those relating to society activities, new hospitals, education, and public health. Programs should be received at least three weeks before the date of meeting.

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MASSACHUSETTS

Dr. Thorn Honored.—Dr. George W. Thorn, Boston, was the recipient of the 1959 Honor Award given by the American Medical Writers' Association. Dr. Thorn is professor of clinical medicine at Harvard University School of Medicine. The Honor Award is given from time to time to nonmembers of the association "who have made distinguished contributions in writing, editing, publishing, or other means of communication in medicine or allied sciences."

Personal.—Dr. Grete L. Bibring, associate clinical professor in psychiatry, Harvard Medical School, Boston, was elected vice-president of the International Psycho-analytic Association. Dr. Bibring is past-president of the Boston Psychoanalytic Society and Institute.—Dr. Charles C. Lund was appointed acting head of the Fifth Surgical Service and the Sears Surgical Laboratory at the Boston City Hospital. Dr. Lund, clinical professor of surgery in Harvard Medical School, was simultaneously appointed as acting head of the Harvard department of surgery at the Boston City Hospital.

Project to Train Psychiatric Aides.—A two-year project to train psychiatric aides at the Boston State Hospital in cooperation with the University's School of Medicine will be under the supervision of Dr. Walter E. Barton, Boston, associate professor of psychiatry at Boston University's School of Medicine and superintendent of Boston State Hospital. The project is supported by a $54,717 grant from the U. S. Department of Health, Education and Welfare, National Institute of Mental Health. Dr. Rufus M. Vaughn, of Amhurst, research assistant in psychiatry at the University of Massachusetts, is director of the project. A model ward of "chronically ill" mental patients will be set up with a team of specialists who will demonstrate to attendants how to develop interpersonal relationships and stimulate ward group activity. The aim of the program is "to shift the attitude and emphasis away from 'custodial care' toward the idea of a true 'therapeutic community.'"

MINNESOTA

Foreign Lecturer.—Dr. G. L. Montgomery, professor of pathology in the University of Edinburgh, Scotland, gave a lecture, "Chronic Thyroiditis," at the Mayo Clinic, Rochester, Oct. 9.

Institute to Study Water Resources.—An institute for the scientific study of the state's water resources including Lake Superior is being esablished at the University of Minnesota as a result of a Louis and Maud Hill Foundation grant of $207,721. The grant, accepted by the university board of regents on May 8, is for a period of five years. The limnological institute is an outgrowth of scientific studies made on Lake Superior and its tributaries by personnel in the University of Minnesota's School of Public Health under contract with the Minnesota Department of Health. The studies were financed by the Minnesota Water Pollution Control Commission. These studies of Lake Superior and its tributaries began in 1956 "to gain a better understanding of the full potential of Lake Superior from the standpoint of waste disposal, water supply, transportation, commercial fishing, tourist attractions, and other factors of economic importance to the state." Over-all project administration has been under the direction of Prof. Herbert M. Bosch, Minneapolis, with Prof. Theodore A. Olson, Minneapolis, in charge of technical work.

NEW YORK

Glaucoma Clinic in Schenectady.—The opening of a glaucoma detection clinic at St. Clare's Hospital, Schenectady, was held recently. The organization of the clinic was conducted by Dr. Peter Sykowski, chief, ophthalmology department, and will be under his direction. The clinic has been set up for families who can not afford a family eye physician. Patients will only be received by appointment which will be made through the social service director of the hospital.

New York City

Fraternity Lecture.—Omicron Chapter of Phi Delta Epsilon Fraternity announced that Dr. Ralph A. Reis, Chicago, will give the Aaron Brown Memorial Lecture at New York Medical College, in the school auditorium, Tuesday, Nov. 24, at 4:30 p.m. His topic will be "Diabetes in Pregnancy."

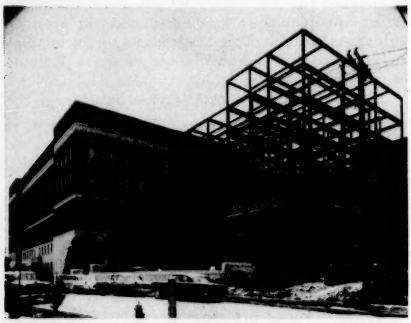
Awards for Papers in Gastroenterology.—The American College of Gastroenterology announced the 1959 Ames Awards for "the best papers published during the past year" in its official publication, *The American Journal of Gastroenterology*. First prize went to Dr. Edward J. Nightingale for his paper, "Gastroenterological Aspects of Periarteritis Nodosa." The second prize was awarded to Drs. Abraham J. Brenner, Adolph Kornstein, Martin Bandler, and Milton J. Matzner, of Brooklyn, for their paper, "Present Status of Gastric Cytology." The third prize was given to Dr. Burrill B. Crohn for "Regional Ileitis, Ileojejunitis, Combined Ileocolitis."

Directory of Health Services.—"How to Secure Help for Those Who Need It," a free 32-page directory to information services in the welfare and health field in New York City, has been published by the Community Council of Greater New York. The booklet is designed to help people find the proper agency for their problem. It lists informa-

tion services on every welfare and health topic including adoption, alcoholism, the blind, camps, child guidance, convalescent care, drug addiction, employment, and vocational counselling, public assistance, housing, mental health, nursing homes, social security, rehabilitation, travelers, unmarried mothers, and veterans. Copies are available to individuals who send a stamped, self-addressed envelope with their request to the Information Bureau Community Council of Greater New York, 345 East 45th St., New York 17. The booklet will be distributed to all city policemen, physicians, taxi cab drivers, lawyers, librarians, personnel directors, and others "who come in daily contact with persons who may need help."

NORTH CAROLINA

Dedicate Medical School Addition.—In observance of the 20th anniversary of the founding of the Bowman Gray School of Medicine of Wake Forest College, Winston-Salem, the school's new 2-million-



The new James A. Gray Memorial Building of Bowman Gray School of Medicine, Winston-Salem. In the foreground is the Research Center being constructed with funds derived from a campaign among the medical alumni.

dollar addition was dedicated Oct. 23. Known as the James A. Gray Memorial Building, the five-story structure more than doubles space previously available to the school since its completion in 1941. The Gray Memorial Building honors the late brother of the man for whom the school is named. A former president and chairman of the board of directors of R. J. Reynolds Tobacco Co., James A. Gray was for many years a benefactor of the school endowing it with one million dollars. The opportunity to transform the two-year Wake Forest Medical School, founded in 1902, into a four-year school was afforded by a bequest from the late Bowman Gray, at his death chairman of the board of directors of R. J. Reynolds Tobacco Co. Dr. C. C. Carpenter, who in 1935 became dean of the two-year Wake Forest Medical School, has continued as dean of Bowman Gray. Judge Hubert E. Olive, of Shelby, president of the Wake Forest board of trustees, presided at the dedication. The entire James A. Gray Memorial Building was open to the public Oct. 22-23, and special exhibits and demonstrations of aids and techniques used in medical education were shown.

TEXAS

Grant for Research in Genetics.—The University of Texas has received a grant of $1,482,480 for basic research in genetics and cell biology over a five-year period. The grant, from the National Institutes of Health, the Public Health Service research center of Bethesda, Md., will support research in the areas of population genetics; genetic effects of radiation and cosmic rays; chromosome studies of cancer and normal cell strains; cytogenetics; and the physiological and biochemical aspects of genetics. Principal investigators will be Wilson S. Stone, Ph.D., Austin, zoology department chairman; and Clarence P. Oliver, Ph.D., Austin; Robert P. Wagner, Ph.D., Austin; John J. Biesele, Ph.D., New York City; Marshall R. Wheeler, Ph.D., Austin; Burke H. Judd, Ph.D., Austin; and Hugh S. Forrest, Ph.D., Pasadena, Calif., of the university's genetics and cell biology group. The university was selected for the grant by the National Advisory Health Council.

WEST VIRGINIA

Unit for Cardiac Work Classification.—Mr. F. Ray Power, Charleston, state director of the division of vocational rehabilitation, announced that West Virginia's first cardiac work classification unit will begin operation at Institute during November. The facility is being sponsored in cooperation with the Kanawha Medical Society, the Kanawha Heart Association, and the West Virginia Heart Association. The unit is designed to assess the potentials of persons with definitely diagnosed cardiac conditions. It is for evaluation purposes only and will in no way serve as a diagnostic or treatment facility for persons with suspected heart conditions. Referrals will be through the Vocational Rehabilitation Division and private physicians throughout the state. Two Charleston physicians, Dr. William C. Stewart and Dr. William C. Revercomb, Jr., will serve on the staff's evaluation team, together with Miss Arla Tucker, a registered nurse technician. A vocational counselor and a social worker will be added as members of the staff.

GENERAL

Surgeons Meeting in Las Vegas.—The International College of Surgeons, United States Section will hold its second western surgical meeting in Los Vegas, Nev., at the Star Dust South Hotel, Nov. 22-24. A total of 15 papers is scheduled on the pro-

gram. A luncheon panel, "Intestinal Surgery," is planned for noon, Nov. 23, and a general luncheon panel will be held Nov. 24. Exhibits and motion pictures are planned. On the evening of Nov. 23 a banquet will be held. Registration fee is $25. A ladies' program is arranged. For information write Dr. Frederick M. Turnbull Jr., 1930 Wilshire Blvd., Los Angeles 57, Secretary.

Medical Conference in Nassau.—The eighth Bahamas Medical Conference will be held Nov. 27-Dec. 17 in Nassau, Bahamas, with headquarters at the British Colonial Hotel. The program includes over 20 speakers and more than 45 papers. Dr. P. David Wheatley, vice-president, section of general practice, Royal Society of Medicine, London, England, will present "The English National Health Scheme" the morning of Nov. 29. Mr. Marlin E. Lerch, eastern director of public relations, Household Finance Corporation, Philadelphia, will present "The Littlest Giant—Your Patient; His Financial Needs Can be Solved" Dec. 6. The ninth Bahamas Medical Conference will be held April 1-14, 1960. For information, write Mr. Irvin M. Wechsler, General Manager, Bahamas Conferences, P. O. Box 1454, Nassau, Bahamas.

Hematology Meeting in St. Louis.—The second annual meeting of the American Society of Hematology will be held Nov. 22-24 in St. Louis. Papers on antibody synthesis will be presented the morning of Nov. 23 with the following titles and participants:

The Acquisition of Immunologic Specificity, Fred Karush, Ph.D., Philadelphia.
"Selection" versus "Instruction" in the Synthesis of Antibodies, Dr. David W. Talmage, Denver.
Antibody Production by Single Cells, Edwin S. Lennox, Ph.D., Ann Arbor, Mich.
Studies on Antibody Synthesis, Dr. Albert H. Coons, Boston.
Immune Tolerance and Autoimmune Disease, Rupert E. Billingham, Ph.D., Philadelphia.

Other major program subjects include, viral etiology, chemical and hormonal factors, and genetics. On Nov. 24 general papers will be presented from the membership at large. For information, write Dr. John W. Rebuck Henry Ford Hospital, Detroit, Secretary.

Dr. Flexner Dies.—The founder and first director of the Institute for Advanced Study at Princeton, N. J., Dr. Abraham Flexner, died Sept. 21 at age 92. Born Nov. 13, 1866, in Louisville, Ky., Dr. Flexner was appointed by Mr. Henry S. Pritchett, head of the Carnegie Foundation for the Advancement of Teaching, to direct an investigation of medical schools that led to the Flexner Report, "Medical Education in the United States and Canada," in 1910. Dr. Flexner visited 155 medical colleges in the United States and Canada. From 1913 to 1929 he served on the staff of the General Education Board and used the office to enlist the elder John D. Rockefeller, its benefactor, in his efforts to revamp medical education. In 1930 Dr. Flexner came out of his first retirement to organize the Institute of Advanced Study. He was awarded the degree of M.D., honoris causa, from the University of Berlin and the University of Brussels.

Prevalence of Poliomyelitis.—According to the National Office of Vital Statistics, the following number of reported cases of poliomyelitis occurred in the United States, it territories and possessions in the weeks ended as indicated:

Area	Oct. 17, 1959 Paralytic Type	Oct. 17, 1959 Total Cases	Oct. 18 1958 Total
New England States			
Maine	7	7	..
New Hampshire	..	..	..
Vermont	3	3	..
Massachusetts	5	6	..
Rhode Island	..	..	..
Connecticut	2	2	2
Middle Atlantic States			
New York	20	35	15
New Jersey	7	7	9
Pennsylvania	10	10	4
East North Central States			
Ohio	1	6	36
Indiana	3	5	6
Illinois	7	11	9
Michigan	6	20	66
Wisconsin	..	3	3
West North Central States			
Minnesota	11	14	3
Iowa	3	6	..
Missouri	9	18	6
North Dakota	..	1	1
South Dakota	..	..	..
Nebraska	1	2	2
Kansas	2	2	3
South Atlantic States			
Delaware	..	1	3
Maryland	7	7	3
District of Columbia	..	..	..
Virginia	13	13	10
West Virginia	7	7	10
North Carolina	15	15	3
South Carolina	1	3	1
Georgia	2	2	..
Florida	1	1	9
East South Central States			
Kentucky	2	2	2
Tennessee	11	13	8
Alabama	5	5	2
Mississippi	5	5	11
West South Central States			
Arkansas	5	7	1
Louisiana	..	..	4
Oklahoma	2	4	2
Texas	8	10	19
Mountain States			
Montana	..	..	..
Idaho	..	..	..
Wyoming	..	..	..
Colorado	2	2	..
New Mexico	..	..	2
Arizona	..	..	..
Utah	..	..	1
Nevada	..	..	..
Pacific States			
Washington	17	17	5
Oregon	8	10	1
California	17	18	23
Alaska	..	..	..
Hawaii	..	..	2
Territories and Possessions			
Puerto Rico	..	..	1
Total	225	300	288

Program for Research in Sex.—The Division of Medical Sciences of the National Academy of Sciences–National Research Council is accepting applications for grants-in-aid on research for consideration by the Committee for Research Problems of Sex. The funds for support of this program are provided by

the Rockefeller Foundation and the Ford Foundation. The committee is concerned primarily with encouraging research on the mechanisms underlying sexual behavior, with special emphasis on the higher mammal and man. Proposals involving endocrinological, neurological, psychological, anthropological, phylogenic, and genetic studies are invited. Requests that deal with the physiology of reproduction or with related biological and biochemic fields should be addressed to the committee "only if they give promise of shedding light upon behavioral mechanisms." Inquiries should be addressed to Room 411, Division of Medical Sciences, National Academy of Sciences–National Research Council, 2101 Constitution Ave., N. W., Washington 25, D. C. Completed applications for 1960-1961 should be postmarked on or before Jan. 15, 1960.

Commission of Neurochemistry.—The Commission of Neurochemistry of the World Federation of Neurology met for the first time at the Institut Bunge in Antwerp, Belgium, Sept. 29-30. Dr. Ludo van Bogaert, Antwerp, president of the federation, and Dr. Charles M. Poser, Kansas City, Kan., medical executive officer, assisted at the meeting. The commission discussed the participation of neurochemists in the different international congresses. A permanent secretariat is to be established at the Institut Bunge, in Antwerp. Dr. A. Lowenthal, Antwerp, was named secretary. Plans were laid for holding a "Symposium on Neurochemistry" in Rome during the Congress on Neurology of 1961. The major topics to be covered are (1) lipids, lipoproteins and their metabolism; and (2) disorders of myelin (not including disseminated sclerosis). The commission plans to establish a registry of neurological material available for neurochemical investigation. Requests and inquiries should be addressed to the secretary of the commission.

Fellowships for Research.—The National Science Foundation announced the award of 35 fellowships for advanced study and research in the sciences in the foundation's Postdoctoral Fellowship Program. All awards were approved by the National Science Board upon the recommendation of Alan T. Waterman, Ph.D., Washington, D. C., director of the foundation. Fellows were selected "on the basis of ability as evidenced by letters of recommendation, academic records, and other evidence of scientific attainment." Final selection of fellows was made by the National Science Foundation. The postdoctoral fellows received an annual stipend of $4,500, an allowance for dependents, and a limited allowance to aid in defraying the cost of travel to the affiliated institution. These awards will enable the recipients to study or carry on their research at 18 institutions in the United States and in 17 foreign institutions. The National Science Foundation is accepting applications for awards to be made in March, 1960, in its graduate and postdoctoral fellowship programs. For information, write the National Science Foundation, 1951 Constitution Ave., N. W., Washington 25, D. C.

Society News.—At its 13th general assembly the **World Medical Association** elected the following officers: president, 1959-1960, Dr. Renaud Lemieux, Canada; president-elect, 1959-1960, Dr. Paul Eckel, Germany; members of council, 1959-1962, Dr. Romeo Y. Atienza, Philippines; Dr. Gunnar Gunderson, La Crosse, Wis.; Dr. A. P. Mittra, India; and Dr. M. Poumailloux, France.—The **American Academy of Physical Medicine and Rehabilitation** elected the following officers for 1959-1960: president, Dr. Clarence W. Dail, Los Angeles; president-elect, Dr. Ray G. Piaskoski, Milwaukee; vice-president, Dr. Robert W. Boyle, Milwaukee; secretary, Dr. Harriet E. Gillette, Gainesville, Fla.; treasurer, Dr. James W. Rae Jr., Ann Arbor, Mich.; and executive secretary, Mrs. Dorothea C. Augustin, Chicago.—Dr. Harold G. Reineke, Cincinnati, was named president-elect of **American Roentgen Ray Society,** succeeding Dr. Edward B. D. Neuhauser, Boston, who became society president. Dr. Reineke assumes the presidency in 1960. Other officers elected include Dr. C. Allen Good, Rochester, Minn., secretary, and Dr. Robert K. Arbuckle, Oakland, Calif., treasurer. Dr. John F. Holt, Ann Arbor, Mich., was elected chairman of the executive council. The society's 1960 meeting will be held Oct. 4-7 in Atlantic City at the Ambassador Hotel.

CANADA

Physicians Meet in Winnipeg.—The American College of Physicians will hold a Prairie Regional Meeting for Manitoba, Saskatchewan, and Alberta at the Auditorium of the Faculty of Medicine, University of Manitoba, and Fort Garry Hotel, Winnipeg, No. 20-21. Dr. Percy H. Sprague, governor of the college for Alberta, will open the program with an address. The following papers include invited participants:

Pulmonary Hypertension, Dr. Richard E. Rossall, Edmonton.
Hypertension in the Male, Dr. Ashley E. Thomson, Winnipeg.
Thyroid Disease, Dr. John P. Gemmell, Winnipeg.
Use of Fluorescent Antibody Technique in the Diagnosis of Systemic Lupus, Dr. Charles Baugh, Saskatoon.
Macroglobulinaemia—Its Clinical Implications, Drs. David E. Rodger and S. R. Meighen, Regina.
Recognition and Diagnosis of Metabolic Bone Disease, Dr. George Jaworski, Saskatoon.
Diabetes and Pregnancy, Dr. Morris Bertrand, Edmonton.
Assessment of Mitral Regurgitation, Dr. Charles P. Newcombe, Rochester.

Dr. Irving S. Wright, New York City, will be the speaker at the evening dinner, presenting "The Role of the American College in Internal Medi-

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cine." For information, write Dr. John F. S. Hughes, 326 Medical Arts Building, Winnipeg, Manitoba, Canada.

CORRECTIONS

Hypertension, Pregnancy, and Pheochromocytoma.—In the Sept. 12 issue on page 151, the clause beginning on line 13 under Report of Cases should have read "labor was induced with intravenously given oxytocin (Pitocin)."

Newer Concepts of Jaundice.—In the Oct. 24 issue, in the editorial on page 1110, right-hand column, the sentence beginning on line 11 should have read "Dutton and Storey [3] demonstrated that the synthesis of uronides in the liver is dependent on the presence of two factors, a heat-stable coenzyme and a heat-labile enzyme." Line 25 should have read "and amines. Included are drugs, e. g., salicylates." In the last paragraph the word "unronide" should have read "uronide."

EXAMINATIONS AND LICENSURE

EDUCATIONAL COUNCIL FOR FOREIGN MEDICAL GRADUATES, INC.

Educational Council for Foreign Medical Graduates: Stations around the world. March 16, 1960 and Sept. 21, 1960. Exec. Director, Dr. Dean F. Smiley, 1710 Orrington Ave., Evanston, Ill.

NATIONAL BOARD OF MEDICAL EXAMINERS

National Board of Medical Examiners: Part I, Various Cities, June 21-22 and Sept. 7-8. Part II, Various Cities, April 19-20. Applications must be received at least six weeks before the date of the examination. Exec. Sec., Dr. John P. Hubbard, 133 South 36th St., Philadelphia.

BOARDS OF MEDICAL EXAMINERS

ALABAMA: *Examination.* Montgomery, June 21-23, 1960. Sec., Dr. D. G. Gill, State Office Bldg., Montgomery.

ALASKA:* On application in Anchorage or Fairbanks. Sec., Dr. W. M. Whitehead, 172 South Franklin St., Juneau.

CALIFORNIA: *Oral.* San Francisco, November 14. *Oral and Clinical.* San Francisco, Nov. 15. Sec., Dr. Lous E. Jones, Room 536, 1020 N Street, Sacramento.

COLORADO:* *Examination.* Denver, Dec. 8-9. *Reciprocity.* Denver, Oct. 14. Exec. Sec., Miss Mary M. McConnell, 715 Republic Bldg., 1612 Tremont Place, Denver 2.

DELAWARE: *Examination.* Dover, Jan. 12-14. *Endorsement.* Dover, Jan. 21. Sec., Dr. Joseph S. McDaniel, Professional Bldg., Dover.

DISTRICT OF COLUMBIA:* *Examination.* Washington, Dec. 14-15. *Reciprocity.* Deputy Director, Mr. Paul Foley, 1740 Massachusetts Ave., Washington 6.

FLORIDA:* *Examination.* Miami Beach, Nov. 22-24. Sec., Dr. Homer L. Pearson, 901 N.W. 17th St., Miami 36.

GUAM: *Subject to Call.* Act. Sec., Dr. F. L. Conklin, Agana.

HAWAII: *Examination.* Honolulu, Jan. 11-12. Sec., Dr. I. L. Tilden, 1020 Kapiolani St., Honolulu.

IDAHO: *Examination* and *Reciprocity.* Boise, Jan. 11, 12, 13. Exec. Sec., Mr. Armand L. Bird, 364 Sonna Bldg., Boise.

INDIANA: *Examination.* Indianapolis, June 1960. *Reciprocity.* Indianapolis, fourth Wednesday of each month. Ex. Sec., Miss Ruth V. Kirk, 538 K. of P. Bldg., Indianapolis.

KANSAS:* *Examination and Reciprocity.* Kansas City, Jan. 15-16. Sec., Dr. F. J. Nash, New Brotherhood Bldg., Kansas City.

KENTUCKY: *Examination.* Frankfort, Dec. 14-15. Asst. Sec., Mrs. Ray Wunderlich, 620 South Third St., Louisville 2.

LOUISIANA: *Examination and Reciprocity.* New Orleans, Dec. 3-5. Sec., Dr. Edwin H. Lawson, 930 Hibernia Bank Bldg., New Orleans 12.

MARYLAND: *Examination.* Baltimore, Dec. 8-11, Sec., Dr. Frank K. Morris, 1211 Cathedral St., Baltimore 1.

MASSACHUSETTS: *Examination.* Boston, Jan. 12-15. Sec., Dr. David W. Wallwork, Room 37, State House, Boston.

MINNESOTA:* *Examination.* Jackson, June 1960. *Reciprocity.* Jackson, Dec. 7, Sec., Dr. A. L. Gray, Old Capitol, Jackson.

NEBRASKA:* *Examination.* Omaha, June 13-15, 1960. Dir., Bureau of Examining Boards, Room 1009, State Capitol Bldg., Lincoln 9.

NEW JERSEY: *Examination.* Jan. 19-22. *Reciprocity.* Monthly, Sec., Dr. Royal A. Schaaf, 28 West State St., Trenton.

NEW MEXICO:* *Examination and Reciprocity.* Santa Fe, Nov. 16-17. Sec., Dr. C. Derbyshire, 227 East Palace Ave., Santa Fe.

NEW YORK: *Examination.* Albany, Buffalo, New York and Syracuse, Dec. 8-11. Sec., Dr. Stiles D. Ezell, 23 South Pearl St., Albany.

NORTH DAKOTA: *Examination.* Grand Forks, Jan. 6-8. *Reciprocity.* Grand Forks, Jan. 9. Sec., Dr. C. J. Glaspel, Box 228, Grafton.

OHIO: *Examination.* Columbus, Dec. 15-17. *Endorsement.* Columbus, Oct. 5. Sec., Dr. H. M. Platter, 21 W. Broad St., Columbus 15.

PENNSYLVANIA: *Examination.* Philadelphia, January. Sec., Mrs. Margaret G. Steiner, Box 911, Harrisburg.

SOUTH CAROLINA: *Examination and Endorsement.* Columbia, Dec. 8. Sec., Dr. H. E. Jervey, Jr., 1329 Blanding St., Columbia.

TEXAS:* *Examination.* Fort Worth, Dec. 3-5. Sec., Dr. M. H. Crabb, 1714 Medical Arts Bldg., Fort Worth 2.

UTAH: *Examination.* Salt Lake City, July 6-8. *Reciprocity.* Salt Lake City, Nov. 17. Director, Mr. Frank E. Lees, 324 State Office Bldg., Salt Lake City 1.

VIRGINIA: *Reciprocity.* Dec. 1, *Examinations* Dec. 2-4 inclusive, Richmond. Address: Board of Medical Examiners, 631 First St. S. W., Roanoke.

WASHINGTON:* *Examination.* Seattle, Jan. 11-13. Administrator, Professional Division, Capitol Bldg., Olympia.

WEST VIRGINIA: *Examination.* Charleston, January. Sec., Dr. Newman H. Dyer, State Office Bldg., No. 3, Charleston 5.

WISCONSIN:* *Examination.* Madison, Jan. 14-16. Sec., Dr. Thomas W. Tormey, Jr., 1140 State Office Building, 1 West Wilson St., Madison.

WYOMING: *Examination and Reciprocity.* Cheyenne, Feb. 1. Sec., Dr. James W. Sampson, State Office Bldg., Cheyenne.

BOARDS OF EXAMINERS IN THE BASIC SCIENCES

ALASKA: *Examination and Reciprocity.* Juneau, November. Sec., Dr. R. Harrison Leer, Alaska Office Bldg., Juneau.

DISTRICT OF COLUMBIA: *Examination.* Washington, Nov. 23-24. Deputy Director, Mr. Paul Foley, 1740 Massachusetts Ave., Washington 6.

RHODE ISLAND: *Examination.* Providence, Nov. 18. *Reciprocity.* Providence, Nov. 4. Administrator, Mr. Thomas B. Casey, 366 State Office Bldg., Providence.

SOUTH DAKOTA: *Examination.* Vermillion, Dec. 4-5. Dr. Gregg M. Evans, 310 East 15th St., Yankton.

WASHINGTON: *Examination.* Seattle, Jan. 6-7. Sec., Mr. Thomas A. Carter, Capitol Bldg., Olympia.

WISCONSIN: *Examination.* Milwaukee, Dec. 5, Madison, Apr. 9, Sec., Mr. Wm. H. Barber, 621 Ranson St., Ripon.

*Basic Science Certificate required.

DEATHS

Arnold, Elmer William Ⓜ Adrian, Minn.; University of Nebraska College of Medicine, Omaha, 1907; member of the American Academy of General Practice; veteran of World War I; formerly mayor of Bigelow; served as president of the school board, the Southwestern Minnesota Medical Society, and the Sioux Valley Medical Association; surgeon for the Northwestern Railroad; the Dr. Arnold Memorial Hospital was named in his honor; died Sept. 2, aged 77.

Bailey, Edward B. Ⓜ Wichita Falls, Texas; Baltimore Medical College, 1909; formerly practiced in Austin; died Aug. 22, aged 73.

Baird, Homer Dale Ⓜ Montreal, Wis.; University of Pennsylvania School of Medicine, Philadelphia, 1911; member of the Industrial Medical Association; for many years on the staff of the York (Pa.) Hospital; died in the Trinity Hospital, Ashland, Aug. 25, aged 69.

Beigler, Sydney Karl Ⓜ Detroit; University of Michigan Medical School, Ann Arbor, 1924; at one time taught at the University of Wisconsin Medical School in Madison; fellow of the American College of Surgeons; on the staffs of the Sinai and Harper hospitals; died Sept. 5, aged 60.

Benton, Charles Crisp Ⓜ Macon, Ga.; born in Monticello May 30, 1919; University of Georgia Medical Department, Augusta, 1944; specialist certified by the American Board of Anesthesiology; member of the American Society of Anesthesiologists, Inc.; interned at the Jefferson and Hillman Hospital in Birmingham, Ala.; served a residency at the Crawford W. Long Memorial Hospital in Atlanta, Ga., and the University Hospital in Augusta, Ga.; served as a lieutenant commander in the medical corps of the U. S. Naval Reserve; associated with the Macon, Parkview, Middle Georgia, and St. Luke hospitals; died Aug. 22, aged 40.

Bintakys, Fricas Martynas, Brooklyn; Vytauto Didziojo Universiteto Medicinos Fakulteto, Kaunas, Lithuania, 1941; interned at the Prospects Heights Hospital; died Sept. 3, aged 48.

Boggs, Nathan Ⓜ Goodwell, Okla.; Rush Medical College, Chicago, 1906; veteran of World War I; for many years practiced in Oklahoma City, where he served a term as trustee of the Oklahoma City University, and was on the staff of the Wesley Hospital; at one time on the faculty of the University Medical College in Kansas City, Mo.; from 1952 to 1957 on the medical staff of the Panhandle A. & M. College; died in the Guymon (Okla.) Municipal Hospital Aug. 31, aged 80.

Bowman, Douglas Clyde Ⓜ Naches, Wash.; Washington University School of Medicine, St. Louis, 1928; member of the American Academy of General Practice; died in the Yakima Valley Memorial Hospital Aug. 29, aged 58.

Brown, Clarence Morgan, Adairville, Ky.; University of Tennessee Medical Department, Nashville, Tenn., 1898; died in the Baptist Hospital, Nashville, Tenn., Aug. 15, aged 84.

Camp, Donald Evans, West Union, Iowa; State University of Iowa College of Medicine, Iowa City, 1924; veteran of World War II; died in Detroit Aug. 28, aged 62.

Camp, Harold Manlove Ⓜ Monmouth, Ill.; born in Brooklyn, Ill., July 24, 1885; Northwestern University Medical School, Chicago, 1909; councilor from 1922 to 1924 of the Fourth District of the Illinois State Medical Society of which he was secretary from 1924 to 1942, when he became secretary treasurer; from 1912 to 1924 secretary of the Warren County Medical Society; served as president of the National Conference on Medical Service, formerly the Northwest Regional Conference, of which he was secretary; served as vice-president of the Aero Medical Association; first medical examiner for the Civil Aeronautics Administration in Monmouth; in 1937 appointed a member of the committee to the then newly created advisory board of the Division for Handicapped Children, State Department of Public Welfare; formerly member of the House of Delegates of the American Medical Association; past-president of the Monmouth Medical Club; member of the World Medical Association; an honorary member of the Fifty Year Club of the Texas Medical Association; during World War II, served as state chairman for Procurement and Assignment Service for Physicians under the War Manpower Commission; on Sept. 24, 1959 the Warren County Medical Society and the Monmouth Medical Club honored him; the occasion marked his fifty years as a physician; in June 1958 Northwestern University honored him with a Merit Award; past-president of the Monmouth Rotary Club; on the staff of the Monmouth Hospital; in September 1959 honored by the Chicago, Burlington and Quincy Railroad for his many hundred miles of traveling, commuting between the offices of the Illinois State Medical So-

Ⓜ Indicates Member of the American Medical Association.

ciety in Chicago and Monmouth; since 1941 editor of the *Illinois State Medical Journal*; died in St. Mary's Hospital, Galesburg, Oct. 17, aged 74.

Carroll, Harry Roland, Baltimore; University of Maryland School of Medicine and College of Physicians and Surgeons, Baltimore, 1917; veteran of World War I; formerly associated with the U. S. Public Health Service, serving for many years as director of the Custom House out-patient annex of the U. S. Public Health Service Hospital, where he died Sept. 7, aged 65.

Colwell, John Bruner Ⓜ Champaign, Ill.; Rush Medical College, Chicago, 1902; from 1904 to 1911 assistant warden at the Cook County Hospital in Chicago; served as attending physician on the staff of the Cunningham Children's Home in Urbana; on the staff of the Burnham City Hospital; died in the Carle Memorial Hospital in Urbana Sept. 17, aged 86.

Comfort, John Burke, Trenton, N. J.; University of Pennsylvania School of Medicine, Philadelphia, 1919; past-president of the Mercer County Medical Society; veteran of World War I; on the staff of St. Francis Hospital, where he died Aug. 27, aged 66.

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Darling, Earl H., Milwaukee; Wisconsin College of Physicians and Surgeons, 1907; associated with St. Mary's and Columbia hospitals; died Aug. 25, aged 76.

Dillingham, Frank Stinson Ⓜ Los Angeles; University of Southern California College of Medicine, Los Angeles, 1900; specialist certified by the American Board of Urology; member of the American Urological Association and served as secretary of the Western Branch; for many years on the staff of the California Hospital; died in St. John's Hospital in Santa Monica Aug. 31, aged 80

Donnelly, James Herbert Ⓜ Buffalo, N. Y.; McGill University Faculty of Medicine, Montreal, Que., Canada, 1906; specialist certified by the American Board of Internal Medicine; member of the American College of Chest Physicians; fellow of the American College of Physicians and past president of the New York State Chapter; past-president of the Buffalo Academy of Medicine; member of the Catholic Physicians Guild; served on the faculty of the University of Buffalo School of Medicine; for many years director of tuberculosis for the city health department; examiner for the Selective Service during World War I; honorary consultant at the Edward J. Meyer Memorial Hospital and Sisters of Charity Hospital, where he died Aug. 31, aged 84.

Dunn, Burton Leonard, Babylon, N. Y.; Syracuse University College of Medicine, 1897; died in the Oneida City Hospital in Oneida Aug. 24, aged 88.

Dunscombe, William Colby Ⓜ Mayaguez, P. R.; American Medical Missionary College, Battle Creek, Mich., and Chicago, 1906; L.R.C.P. and L.R.C.S., of Edinburgh, and L.R.F.P.&S., of Glasgow, Scotland, 1912; for many years a medical missionary; served with the U. S. Public Health Service; at one time superintendent of the Wabash Valley Sanitarium in Lafayette, Ind.; died Aug. 24, aged 78.

Egenolf, George Franklin Ⓜ San Diego, Calif.; born in Orange, N. J., July 6, 1920; Stanford University School of Medicine, San Francisco, 1945; interned at the Naval Hospital in San Diego; served a residency in pathology at St. Vincent's Hospital in Los Angeles; served a residency in surgery and obstetrics and gynecology at the San Diego County General Hospital; veteran of World War II; specialist certified by the American Board of Obstetrics and Gynecology; associated with the Scripps Memorial Hospital in La Jolla and the Sharp Memorial Hospital and Mercy Hospital; died in La Paz, Baja California, Mexico, Aug. 21, aged 39.

Etheridge, Isaac Holder, Atlanta, Ga.; Emory University School of Medicine, Atlanta, 1917; for many years county physician; trustee of Ardmore Children's Convalescent Hospital; associated with the Jesse Parker Williams Hospital and the Crawford W. Long Memorial Hospital, where he died Aug. 26, aged 71.

Evans, Alexander Leon, Brooklyn; Universität Bern Medizinische Fakultät, Switzerland, 1935; member of the American Academy of General Practice; veteran of World War II; served on the staffs of the Doctors Hospital in New York City, Coney Island, Madison Park, Kingshighway, and Brooklyn hospitals; died Sept. 10, aged 49.

Evans, Mary Louise, Doylestown, Pa.; Woman's Medical College of Pennsylvania, Philadelphia, 1906; died in New Britain June 15, aged 77.

Foster, Maude Elizabeth Ⓜ Atlanta, Ga.; Medical College of South Carolina, Charleston, 1922; died July 30, aged 75.

Fox, Carl Alexander Ⓜ Birmingham, Ala.; Medical Department of Tulane University of Louisiana, New Orleans, 1900; served on the staff of the Children's Hospital; died in Woodmere, N. Y., Aug. 20, aged 80.

Freeman, Robert Herman, Raleigh, N. C.; Jefferson Medical College of Philadelphia, 1908; died in the Rex Hospital Aug. 22, aged 74.

Frenkiel, Henry Ⓜ New York City; Uniwersytet Jozefa Pilsudskiégo, Warszawa, Poland, 1925; interned at the Fordham Hospital, where he served

a residency; formerly a resident at the Roosevelt Hospital in New York City and the Kings County Hospital in Brooklyn; died June 14, aged 64.

Gibson, William John Ⓜ Hollywood, Fla.; University of Buffalo School of Medicine, 1917; for many years practiced in Rochester, N. Y.; veteran of World War I; died Sept. 6, aged 72.

Glassman, Joseph Ⓜ New York City; University and Bellevue Hospital Medical College, New York City, 1915; executive director and chief of internal medicine at Stuyvesant Polyclinic and consulting physician at the Italian Hospital; died Sept. 10, aged 76.

Goode, John William Ⓜ San Antonio, Texas; University of Texas School of Medicine, Galveston, 1912; fellow of the American College of Surgeons; past-president of the Bexar County Medical Society; associated with the Baptist Memorial Hospital and the Nix Memorial Hospital; died Aug. 30, aged 73.

Gutierrez, Juan Bautista, Brownsville, Texas; Universidad Nacional Facultad de Medicina, México, D. F., 1913; died in the Mercy Hospital June 15, aged 76.

Heilbrunn, Max Ⓜ Lockwood, Mo.; Ludwig–Maximilians–Universität Medizinische Fakultät, München, Bavaria, Germany, 1924; interned at the Menorah Hospital in Kansas City, Mo.; associated with the Lockwood Memorial Hospital, where he died Aug. 26, aged 62.

Herbst, Frank Ⓜ Kansas City, Mo.; Harvard Medical School, Boston, 1901; died July 26, aged 81.

Jackson, Henry Bruce, Newnan, Ga.; Hospital Medical College, Eclectic, Atlanta, 1909; died in the Newnan Hospital July 28, aged 73.

Jefferson, Charles William Ⓜ Louisville, Ky.; University of Louisville Medical Department, 1910; served in the medical corps of the American and British armies during World War I; member of the Southeastern Surgical Congress and the Industrial Medical Association; fellow of the International College of Surgeons; past-president of the staffs of the Jewish Hospital and St. Anthony Hospital, where he died Sept. 2, aged 70.

Johnson, Marvin Anthon Ⓜ Plainview, Neb.; University of Nebraska College of Medicine, Omaha, 1935; interned at the Douglas County Hospital in Omaha; member of the American Academy of General Practice; died in the Plainview General Hospital Aug. 19, aged 49.

Jones, Harold Walter Ⓜ Philadelphia; born in Newark, N. J., Feb. 1, 1891; Jefferson Medical College of Philadelphia, 1917; specialist certified by the American Board of Internal Medicine; professor of clinical medicine, emeritus, at his alma mater, where he was the first person to hold the Thomas Drake Martinez Cardeza Chair of clinical medicine and hematology established in 1941; member of the Association of American Physicians; fellow of the American College of Physicians; founder and first president of the Jefferson Society of Clinical Investigation; in 1941 received a certificate of merit from the American Medical Association for an exhibit on infusions of blood and other fluids into the circulation via the bone marrow; veteran of World War I; a member of the board of corporators of the Peddie School in Hightstown; served as director of the Charlotte Drake Cardeza Foundation and Laboratories of the division of hematology at Jefferson Medical College; died Sept. 2, aged 68.

Jones, Ransom Julaney Ⓜ Kinston, N. C.; Emory University School of Medicine, Atlanta, 1932; health officer of Lenoir and Jones counties; veteran of World War II; died Aug. 20, aged 51.

Kimbrough, Charles Talmage, New York City; Syracuse University College of Medicine, 1925; veteran of World War I; died in the Veterans Administration Hospital Aug. 14, aged 65.

Lewis, Michael, Georgetown, Mass.; Kansas City (Mo.) University of Physicians and Surgeons, 1938; for many years associated with the Baldpate Hospital; died in Portsmouth, N. H., Sept. 1, aged 51.

Lippman, Louis Simeon Ⓜ Chicago; Chicago College of Medicine and Surgery, 1911; died Sept. 1, aged 79.

McLaughlin, Ralph Lenard Ⓜ San Antonio, Texas; University of Louisville (Ky.) School of Medicine, 1917; served with the U. S. Veterans Administration; veteran of World War I; died in the Scott and White Memorial Hospital in Temple June 5, aged 67.

Mixson, Harold Joyce Ⓜ Beaumont, Texas; Tulane University School of Medicine, New Orleans, 1921; at one time associated with the South Mississippi Charity Hospital in Laurel; died in the Baptist Hospital of Southeast Texas Aug. 29, aged 64.

Mundell, Joseph Joshua Ⓜ Washington, D. C.; born in Anacostia Dec. 22, 1879; Georgetown University School of Medicine, Washington, 1903; specialist certified by the American Board of Obstetrics and Gynecology; fellow of the American College of Surgeons; resigned from the regular Navy on Feb. 6, 1942; professor of obstetrics from 1934 to 1947, when he became professor of obstetrics emeritus at his alma mater; charter member and past-president of the Washington Gynecological Society; helped found the Georgetown Clinical Society, which in 1945 presented him with its first G award for dis-

tinguished service in the practice of medicine or surgery; consultant to the U. S. Naval Hospital in Bethesda; associated with the Providence Hospital, Georgetown Hospital, and Columbia Hospital for Women; died at Ocean City, Md., Aug. 30, aged 79.

North, Frank Raymond Ⓜ Winfield, Iowa; Keokuk (Iowa) Medical College, College of Physicians and Surgeons, 1904; past-president of the Henry County Medical Society; died in Muscatine Aug. 15, aged 83.

Oakley, E. Reed Ⓜ Pasadena, Calif.; University of Nebraska College of Medicine, Omaha, 1932; also a graduate in pharmacy; interned at the University of Nebraska Hospital in Omaha; formerly practiced in Lincoln, Nebr.; died Aug. 20, aged 60.

Otto, Harold Lese, New York City; University and Bellevue Hospital Medical College, New York City, 1920; associated with the Beth Israel Hospital and the Hospital for Joint Diseases; died in Saratoga Springs, N. Y., Sept. 9, aged 65.

Powers, Edward Parnell Ⓜ Boston; Georgetown University School of Medicine, Washington, D. C., 1905; associated with the Milton (Mass.) Hospital, New England Hospital, and the Parker Hill Medical Center; died Sept. 2, aged 78.

Pratt, George Olin Ⓜ Alburg, Vt.; born in Enosburg Falls, June 5, 1910; University of Vermont College of Medicine, Burlington, 1935; interned at the Bishop De Goesbriand Hospital in Burlington; during World War II served overseas in the European Theater as commanding officer of the 70th Station Hospital, during which time he received numerous commendations and decorations; in 1946 discharged from Army with the rank of colonel; member of the Association of Military Surgeons of the United States and the Reserve Officers Association; became associated with the Veterans Administration and after a short time in the Shreveport, La., regional office became manager of the Veterans Administration Hospital in Amarillo, Texas; later became assistant director of the New England–New York area of the Veterans Administration; served as manager of the Veterans Administration hospitals in Manchester, N. H., Brooklyn, and Syracuse, N. Y.; in 1956 established the Pratt Clinic in Alburg, serving as director as well as county medical examiner and health officer; associated with the Kerbs Memorial Hospital and St. Albans Hospital in St. Albans; a member of Rotary Club; died Aug. 26, aged 49.

Quirk, William Ambrose, Evergreen, La.; Louisville (Ky.) Medical College, 1889; died July 18, aged 93.

Randall, Joseph Alexander Ⓜ Harrisburg, Pa.; Howard University College of Medicine, Washington, D. C., 1931; civilian chief of occupational medicine at the Olmsted Air Force Base in Middletown, where he died Sept. 2, aged 54.

Reetz, Frederick August Ⓜ Shelby, Mich.; the Hahnemann Medical College and Hospital, Chicago, 1905; at one time practiced in Muskegon, Mich., where he was on the staff of the Hackley Hospital; on the staff of the Shelby Community Hospital; died Aug. 17, aged 76.

Richmond, James, Coquille, Ore.; Saginaw (Mich.) Valley Medical College, 1902; died in Myrtle Point Sept. 2, aged 85.

Robbins, Noel Walker, Delray Beach, Fla.; Duke University School of Medicine, Durham, N. C., 1932; interned at the Duke Hospital in Durham, N. C., and the Charlotte Memorial Hospital in Charlotte, N. C.; died in the Bethesda Hospital in Boynton Beach July 18, aged 51.

Rosenthal, Jacob Sontheimer, Washington, D. C.; Tulane University School of Medicine, New Orleans, 1915; veteran of World War I; died near Sweetwater, Tenn., Sept. 5, aged 65.

Rutledge, John Richard, Greenwich, N. Y.; University of Rochester School of Medicine and Dentistry, Rochester, N. Y., 1958; interned at the Bellevue Hospital Center in New York City; captain in the U. S. Air Force; died Aug. 25, aged 27.

Saville, John William, Bethesda, Md.; George Washington University School of Medicine, Washington, D. C., 1953; formerly served in the U. S. Naval Reserve; interned at the Naval Hospital in Bethesda, Md.; served a residency at the Bellevue Hospital Center in New York City and the Massachusetts General Hospital and the Children's Medical Center in Boston; orthopedic resident at the District of Columbia General Hospital in Washington, D. C.; certified by the National Board of Medical Examiners; died in Annapolis, Md., Sept. 12, aged 30.

Shapiro, Julius Robert, Belle Harbor, N. Y.; University of Dublin School of Physics, Trinity College, Dublin, Ireland, 1935; interned at Jersey City Hospital in Jersey City, N. J., and Hudson County Tuberculosis Hospital and Sanatorium in Secaucus, N. J.; served a residency at the Boulevard Hospital, Long Island City, N. Y., and the Brooklyn Eye and Ear Hospital in Brooklyn; died in the Beth Israel Hospital in New York City Aug. 23, aged 49.

Smith, Millicent Zenos Ⓜ Palo Alto, Calif.; Baylor University College of Medicine, Dallas, 1941; interned at Santa Clara County Hospital in San Jose,

Calif.; veteran of World War II; member of the American Academy of General Practice; died Aug. 30, aged 46.

Studer, Adolph Gustav, Grosse Pointe, Mich.; Detroit Homeopathic College, 1903; retired general secretary of the Detroit YMCA; died in the Bon Secours Hospital Aug. 16, aged 91.

Taylor, George Mosser Ⓜ Los Angeles; College of Medical Evangelists, Loma Linda and Los Angeles, 1924; certified by the National Board of Medical Examiners; specialist certified by the American Board of Orthopaedic Surgery, Inc.; member of the American Academy of Orthopaedic Surgeons; fellow of the International College of Surgeons; professor and chairman of the department of orthopedic surgery at his alma mater; on the senior attending staff of the Los Angeles County Hospital and the White Memorial Hospital; died Sept. 1, aged 61.

Taylor, H. Williams Ⓜ Little Compton, R. I.; born in 1886; Columbia University College of Physicians and Surgeons, New York City, 1915; fellow of the American College of Surgeons; served as member and chairman of the Little Compton school committee and as medical examiner; a staff surgeon at St. Anne's Hospital in Fall River, Mass.; on the courtesy staffs of the Truesdale and Union hospitals of Fall River, Mass., and St. Luke's Hospital in New Bedford, Mass.; at one time practiced in Englewood, N. J., where he was associated with the Englewood Hospital; died Sept. 7, aged 72.

Theriault, Louis Leo Ⓜ Wethersfield, Conn.; Jefferson Medical College of Philadelphia, 1918; died Aug. 30, aged 66.

Thomas, Edward Philip Ⓜ Frederick, Md.; University of Maryland School of Medicine and College of Physicians and Surgeons, Baltimore, 1916; member of the founders group of the American Board of Surgery; fellow of the American College of Surgeons; past-president of the Medical and Chirurgical Faculty of Maryland and the Frederick County Medical Society; past-president of the state board of medical examiners; veteran of World War I; associated with the Frederick Memorial Hospital; died Aug. 25, aged 67.

Timm, John A., Brooklyn; University of Minnesota Medical School, Minneapolis, 1919; fellow of the American College of Surgeons; veteran of World War I; served on the staffs of the Kingston Avenue, Methodist, and Cumberland hospitals; died in Altura, Minn., July 22, aged 69.

Toller, Else Ⓜ New York City; Ludwig–Maximilians–Universität Medizinische Fakultät, München, Bavaria, Germany, 1919; interned at the Bronx Hospital in New York City; served a residency at the Overlook Hospital in Summit, N. J., and the Craig House in Beacon, N. Y.; associated with the U. S. Veterans Administration; died in the Flower and Fifth Avenue Hospitals Aug. 5, aged 66.

Tomb, Andrew Spencer Jr. Ⓜ Victoria, Texas; Tulane University School of Medicine, New Orleans, 1933; served as vice-president of the Texas Medical Association; past-president of the Texas Academy of General Practice and the Victoria–Goliad–Calhoun Counties Medical Society; past-president of the Victoria Independent School Board; member of the American Academy of General Practice and the Industrial Medical Association; died in Shreveport, La., Aug. 26, aged 48.

Torrence, Allen Coutler, Hot Springs National Park, Ark.; Meharry Medical College, Nashville, Tenn., 1912; died in the Quachita General Hospital Aug. 15, aged 70.

Vinson, Porter Paisley Ⓜ Richmond, Va.; born in Davidson, N. C., Jan. 24, 1890; University of Maryland School of Medicine, Baltimore, 1914; specialist certified by the American Board of Internal Medicine; member of the Southern Medical Association, American Broncho-Esophagological Association, American Association for Thoracic Surgery, Alumni Association of the Mayo Foundation, of which he was president in 1940, Society of the Sigma Xi, Phi Beta Kappa, and the Nu Sigma Nu professional medical fraternity; fellow of the American College of Physicians; professor of bronchoscopy, esophagoscopy, and gastroscopy at the Medical College of Virginia; formerly associated with the Mayo Clinic and Mayo Foundation, Graduate School, University of Minnesota, in Rochester, Minn.; veteran of World War I; on Dec. 12, 1939, delivered the thirteenth annual Dr. Stafford E. Chaille Oration of the Orleans Parish Medical Society in New Orleans; in 1925 the Davidson College in Davidson, N. C., awarded him the honorary degree of doctor of science; died in St. Mary's Hospital, Rochester, Minn., Aug. 28, aged 69.

Watson, Walter Hunter, Greenville, S. C.; Medical College of South Carolina, Charleston, 1939; interned at the Roper Hospital in Charleston; veteran of World War II; associated with the Greenville General Hospital and the St. Francis Hospital, where he served a residency, and where he died Aug. 15, aged 44.

Weinreb, William Aron Ⓜ Brooklyn; Medizinische Fakultät der Universität, Vienna, Austria, 1923; member of the American Academy of General Practice; died in the Jewish Hospital Aug. 23, aged 68.

Zibel, Nathan, Quincy, Mass.; Tufts College Medical School, Boston, 1926; associated with the Brookline (Mass.) Hospital, South Shore Hospital, Weymouth, and the Quincy City Hospital; died in the Bournewood Hospital, Brookline, Aug. 28, aged 56.

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FOREIGN LETTERS

BRAZIL

Intestinal Parasitosis.—Wolffenbuttel and Zelmanowicz (*Journal of the Medical Association of Rio Grande do Sul*, June, 1959) evaluated the treatment of several intestinal parasitoses by new drugs. They summarized their findings as follows: Oxytetracycline was preferred for amebiasis. Giardiasis was treated successfully with a combination of chlorquinaldol, chlorbetamide, and quinacrine. In pinworm infection good results were obtained with piperazine and optional results were obtained with dithiazanine. No completely satisfactory treatment for ascariasis or whipworms was found. Hexylresorcinol in doses of 1 Gm. daily for 5 to 10 days proved effective in the treatment of hookworm. Dithiazanine given in increasing doses (100 mg. on the 1st day, 200 on the 2nd, 300 on the 3rd, and 400 on the 4th to the 10th day) is the drug of choice in the treatment of strongyloidiasis. In the treatment of tapeworms quinacrine administered by duodenal tube was preferred.

CHILE

Scleroderma.—A. Gonzalez Salvatierra (*Rev. méd. Chile* **87**:498, 1959) treated a series of 17 patients who had scleroderma with cortisone or prednisone over a period of one to three years. The results were excellent in eight, good in six, fair in one, and poor in two. In some combining steroid treatment with chloroquine improved the results and made it possible to lower the dosage of cortisone.

Iproniazid and Hepatitis.—Katz and Ducci (*Rev. méd. Chile* **87**:421, 1959) treated a series of 69 patients (48 who had psychiatric disorders and 21 who had angina pectoris) with iproniazid. Both groups were given an initial dose of 100 to 150 mg. daily, and a maintenance dose of 25 to 100 mg. daily. The psychiatric group was treated for an average of 90 days and the cardiac group for an average of 65 days. Only one patient developed hepatitis and this was a viral type. The authors concluded that iproniazid is not hepatotoxic and if hepatitis develops while it is being given some other explanation should be sought.

Splenoportography.—C. Larrain (*Rev. méd. Chile* **87**:410, 1959) performed percutaneous splenoportography on 56 patients, most of whom had cirrhosis of the liver, and obtained positive results in 49. Roentgenograms were made three, six, and nine seconds after injection of the contrast medium. Side-effects (nausea and flushing) appeared in only 10 patients. This procedure proved to be useful in differentiating intrahepatic and extrahepatic portal hypertension and in the diagnosis of the hydatid disease and malignant metastases in the liver.

FRANCE

Exophthalmic Goiter.—At the meeting of the National Academy of Medicine, on Jan. 20, De Gennes reported success with radioiodine (I^{131}) in 90% of 800 patients with exophthalmic goiter. The initial dose proved to be insufficient in 20% of the patients, and they were given another dose a few weeks later. There was no improvement in 3% of the patients.

De Gennes and co-workers (*Semaine des Hôpitaux*, April 28, 1959) reported a series of 138 outpatients with hyperthyroidism who were given I^{131} intravenously in amounts producing about 10,000 rads. Patients in whom signs of progressive hyperthyroidism persisted were given another dose three months later. All the patients in this series had progressive hyperthyroidism and had failed to respond to medical treatment. The follow-up period of 18 months showed that in 79% of the patients the thyroid state returned to normal and the cardiovascular, neurovegetative, and metabolic manifestations disappeared and the body weight returned to normal. In 16% of the patients permanent postoperative hyperthyroidism was noted. The treatment failures in 1.4% and the incomplete cures in 3.6% of the patients were attributable to the atypical characteristics of the disease, and to the relatively moderate uptake of I^{131}. Of 109 patients whose thyroid state returned to normal 60 (55%) had no return of symptoms. Of the remaining 49, exophthalmos returned in 37, goiter returned in 12, and auricular fibrillation returned in 7. The basal metabolic rate (BMR) returned to normal in almost all of the patients whose thyroid state returned to normal without sequelae. The BMR never exceeded 30% in the patients who were cured but who had a return of symptoms. None of the patients developed thyroid cancer, radiation sickness, or hematological disorders. The patients with severe exophthalmos were better able to tolerate large doses of I^{131} than those with mild exophthalmos, and those with cardiac insufficiency or auricular fibrillation had a high tolerance for the drug.

The items in these letters are contributed by regular correspondents in the various foreign countries.

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Hyperthyroidism.—At the meeting of the Academy of Surgery, H. Welti reported a series of 12,000 thyroidectomies which he performed in a period of 30 years. In this series 7,000 had hyperthyroidism, which in most of the patients was severe. They were medically treated before the operation for months or years without success. The operative mortality was only 0.2% despite the severity of the condition in some of the patients. A review of the 6,619 thyroidectomies performed between January, 1951, and October, 1955, revealed that of the 3,371 patients subjected to thyroidectomy because of exophthalmic goiter 8 died, and of the 2,958 who were operated on for simple goiter 5 died.

The great advantage of thyroidectomy over treatment with I^{131} consists, according to the author, in the complete or almost complete cure of the hypothyroidism. In some patients complete cure occurred within a few weeks, and in others even within a few days. In most patients the exophthalmos disappeared promptly. On the other hand, the action of I^{131} is slow and in many patients disappointing. In some patients a severe and persistent myxedema develops after treatment with I^{131}, particularly in patients with exophthalmos aggravated by hypophysial involvement. This thyroid insufficiency is especially unfortunate in older persons who are predisposed to arteriosclerosis by the resulting increase in their cholesterol level. The effect on the gonads is a reason to avoid this treatment in young persons. Treatment with I^{131} is especially contraindicated in children and pregnant women. The author called attention to the fact that thyroidectomies performed after treatment with I^{131} has failed are often technically difficult because the goiters are difficult to exteriorize, they are easily torn, they bleed profusely, and great care is needed to protect the recurrent laryngeal nerves and the parathyroids.

GERMANY

X-ray Contrast Mediums Containing Iodine.—E. Schulte (*Medizinische*, no. 17, page 839, 1959) reported that the number of x-ray examinations with iodine-containing contrast mediums has increased in recent years. Numerous complications following the use of such mediums have been reported in Sweden and America. The author made 6,000 intravenous urographies and 200 venographies in the past 10 years. In this series he observed allergic skin reactions with reddening of the skin, itching, urticaria, and edema in only three patients. These side-effects were successfully treated with antihistaminics. Prior to the examinations with the contrast mediums, some drops of the agent to be used were instilled into the patients' conjunctivas. Since these tests were negative even in the patients who later showed allergic reactions, it was of no prognostic value. With every contrast demonstration with mediums containing iodine it is, however, necessary that a sterile syringe and antihistaminics be kept at hand to remedy any allergic reactions at once. Even with slow injections patients complain sometimes of hot flushes, dizziness, and nausea. In some, vomiting may occur. These reactions subside completely after a few minutes.

Iodipamide used for 2,500 cholecystograms was well tolerated. A severe collapse with generalized exanthema was observed in one patient after a dose of only 1.5 cc. With intra-arterial administration of the contrast agents the author knew of 300 such cases. Side-effects occurred more frequently and were more severe than when intravenous injections were given. Prior to every injection the cardiac, circulatory, and renal function should be examined. With cerebral angiographies hemiplegia occurred in one patient but disappeared completely after two days. Allergic reactions were seen in two arteriographies. A severe complication occurred in a woman with peripheral circulatory disorders in the lower extremities, after a total of 120 cc. of a contrast agent had been given. The patient suffered an anaphylactic shock, anuria, and nephrotic changes. It is recommended that, if possible, not more than 60 cc. of a contrast medium containing iodine be given at a time.

Nicotine and Circulatory Diseases.—F. Lickint (*Landarzt* 35:470, 1959) reported on experimental investigations which showed that while smoking one cigarette about 1.6 mg. of nicotine is taken up by the lungs. The amount of the nicotine reaching the blood stream is sufficient to produce the typical effects on the circulation. The effect of nicotine on the capillaries can be observed on the nail-groove. The capillaries are constricted and partly even occluded, which results in stasis. Not all parts of the body respond in the same manner. This phenomenon is not seen, for instance, in the ears. A marked fall of temperature is produced at the peak of the capillary constriction. This begins after about 10 minutes and reaches the lowest value after 30 minutes. After 60 minutes the normal temperature is restored. The average drop of temperature is between 2.5 and 3.2 C. A constriction of the arterioles is also observed. This can best be demonstrated by the time required for the rewarming of the fingers after a five-minute handbath in water at 15 C. This time of rewarming is lengthened by smoking a single cigarette, and lasts one hour instead of only five minutes.

Dr. Güth demonstrated that the rewarming of the skin (normally achieved after massage) is completely missing if the patients smoke a cigarette during treatment. It was shown in animal experiments with contrast agents that the arteries contracted like a string of pearls when nicotine was given. Follow-up examinations in patients suffering from vascular diseases, in whom vascular transplan-

tation had to be performed, showed that the restoration of the normal blood supply could be achieved only in nonsmokers. Cigarette smoking also played a great part in the healing process of frostbite in World War II. Alterations of coronary vessels could be produced experimentally in animals by regular administration of nicotine. These findings are in agreement with clinical experiences. Myocardial infarction occurs much more frequently in smokers than in nonsmokers. In these cases, hormonal factors also seem to play a part. The nicotine probably eliminates the vasopressin of the posterior lobe of the hypophysis, which, in turn, produces vasoconstriction and inhibition of diuresis.

Embryonal Carcinosarcoma.—P. Kolle (*Deutsche med. Wchnschr.* **84**:1287, 1959) stated that the prognosis in children with sarcoma of the kidneys is better than previously. Operation and immediate subsequent irradiation is the method of choice. Patients with nephroblastoma should be operated on four or five hours after admission. Any further delay may worsen the prognosis. Undue palpation may result in dissemination of tumor cells; therefore, examination should be performed once only and as carefully as possible. Less experienced surgeons should choose preliminary irradiation, since a marked involution of the tumor is usually achieved by this measure. In consequence tearing of the tumor during operation occurs less frequently, and the tumor cells do not get into the blood stream so easily by manipulations. An optimal result can only be obtained if children with nephroblastoma are treated in suitable clinics. The decisive factor, however, is the early diagnosis.

Pulmonary Embolism.—Böwing and Thedering (*Landarzt* **35**:464, 1959) reported that pulmonary embolism was found to be the cause of death in about 3% of autopsies. Thrombosis is found mostly in the region of the inferior vena cava, whereas thromboses in the region of the superior vena cava are very rare. Patients with pulmonary embolism do not always take the same course. Only 18% died within the first 24 hours, 42% in one to seven days, and 40% after seven days. These figures show that proper therapy of pulmonary embolism is possible in most patients. Pulmonary embolism occurs more frequently in women than in men. Massive embolism of the main trunk or of one of the two main branches of the pulmonary artery leads to sudden death, but in most patients only the smaller arteries are affected. Death is probably due to an acute strain of the right heart, as a result of which collapse of the systemic circulation with cerebral anoxemia and coronary insufficiency may occur; 75% of the patients complain of severe chest pain.

Here a distinction must be made between the first phase of pain, due to the excessive dilatation of the pulmonary vessels, and the second or late phase of the pain. The latter is caused by the accompanying pleurisy. Besides the pain there is often a collapse with severe dyspnea associated with anxiety and blood-stained sputum, especially when congestion of the pulmonary circulation was already present. General vegetative symptoms, such as fever, leukocytosis with a shift to the left and eosinopenia, accelerated sedimentation rate, and a shift in the region of serum albumin occur after some hours. Roentgenographic findings are recognizable only after 24 hours, mostly in the form of round shadows or atelectasis. Electrocardiograms reveal cor pulmonale, sometimes incomplete right heart block, and more or less defined alterations of the final ventricular deflections. The findings may suggest pulmonary infarction, pericarditis, pleurisy, or acute abdominal disease. The first therapeutic measures are to care for the dilatation of the bronchial arteries, to combat the shock, and to prevent further embolic complications. The drugs to be given are papaverine, a papaverine homolog (Eupaverine), theophylline preparations, and morphine for the relief of pain.

In severe embolism with shock, the shock should be treated first since in this state patients are not transportable. Circulatory stimulants and digitalis preparations should also be given. In order to prevent further embolism it is necessary to administer heparin. The doses should be large enough to reduce the risk of further embolism. Heparin is at first injected every six hours. On the second or third day a change to bishydroxycoumarin should be made. Careful checks of the bleeding time are indispensable. If hemorrhages do occur while heparin is being given, protamine sulfate may be used as an antidote, and when hemorrhages occur while bishydroxycoumarin is being given, vitamin K is the preferred antidote. Special care should be taken with anticoagulants in the presence of liver diseases. Allergic reactions may occur with heparin preparations which necessitate a change to another preparation.

γ-globulins for Hepatitis.—H. Mittelmeier of the Free University of Berlin (*München. med. Wchnschr.* **101**:1450, 1959) reported on the treatment of viral hepatitis, an epidemic of which developed in an orthopedic ward. The epidemic lasted for about six months during which six children and five members of the hospital staff became victims. The serial immunization of the department with γ-globulins given in two doses of 0.02 ml. per kilogram of body weight, at intervals of two to three weeks, resulted in cessation of the epidemic.

Seborrheic Dermatitis.—G. Wolfram (*München. med. Wchnschr.* **101**:1398, 1959) reported a series of 85 infants admitted to the hospital with seborrheic dermatitis who were given injections of vitamin B_{12} in a dosage of 15 to 30 mcg. weekly and

appropriate nourishment. A bland ointment was applied locally. In each case all skin lesions were cured within 18 to 21 days and the concomitant anemia was improved.

Spiramycin.—G. Muhlhardt (*Deutsche med. Wchnschr.* 84:1545, 1959) used spiramycin in the treatment of gram-positive and gram-negative infections in 60 patients (33 with local abscesses or carbuncles, 14 with osteomyelitis, 8 with cholangitis, 4 with pleural empyema, lung abscess or pneumonia, and 1 with enterocolitis). Good results were obtained in 52 patients. Most of the infections were due to hemolytic Staphylococcus aureus. The drug was well tolerated and without significant side-effects. The following indications proved reliable: (1) infections with organisms resistant to the common antibiotics, (2) osteomyelitis, and (3) biliary tract infections because the drug is concentrated in bile.

Vitamin K Treatment in Neonates.—Synthetic vitamin K given by J. Ströder and co-workers of Würzburg (*Deutsche med. Wchnschr.* 84:1553, 1959) in doses of 10 mg. intramuscularly or 30 mg. by mouth proved effective and produced no side-effects when given to a large number of full-term and premature newborn infants. Vitamin K_1 however was found to be even more effective, 1 mg. intramuscularly being a fully effective dose. It achieved complete and rapid reversal of all clotting deficiencies caused by a lack of vitamin K in the premature infants.

Detoxication with Polyvinylpyrrolidone.—As a result of many years of experience with a 6% isotonic solution of polyvinylpyrrolidone (PVP) having a mean molecular weight of 12,600, H. Sikorski of Kaiserslautern (*Clinical Excerpts*, vol. 4, 1959) considered the preparation valuable for effecting detoxication and combating dehydration. It proved its value, for example, in 359 patients with burns, mostly severe. After a loss of 300 to 500 cc. of blood or serum up to 1,000 cc. of PVP solution was infused at a rate of 100 cc. in 10 to 15 minutes. When it was possible to make the infusion shortly after the accident, the primary shock was always prevented. Combined local dressings and PVP solution also prevented the development of keloids.

In radiation sickness, subjective symptoms usually disappeared after the third injection of 50 cc. of PVP solution, given daily in combination with vitamins and dextrose. The severe symptoms of acute allergic toxicodermas, with edema of the face and extremities, were also greatly benefited by drip infusions or three daily injections of 100 cc. of PVP solution. Patients with oliguria after poisoning with heavy metals and others with cerebral edema resulting from administration of the arsphenamines were also successfully treated with PVP. Liver damage subsequent to arsphenamine treatment improved under simultaneous liver therapy and PVP treatment in a short time and was completely cured within a few months. Herpes gestationis in 21 women disappeared after combined treatment with 10 cc. of PVP solution plus a carbonase inhibitor and promethazine. In 37 patients with endarteritis obliterans and thromboangiitis obliterans in whom treatment with vasoactive drugs and bed rest had been unavailing daily injections of PVP solution (in some patients up to 300 cc.) caused the pain to subside after a short time. The affected areas cleared and the necrotic distal parts showed distinct demarcation.

INDIA

Anticoagulant Therapy.—R. N. Chakravarti and coworkers (*Indian Journal of Medical Sciences*, vol. 13, July, 1959) stated that drugs of the heparin type have been found to be effective against cardiovascular thromboembolic diseases, which, in most cases, are associated with atherosclerosis. They studied another type of anticoagulant, ethyl-biscoumacetate (Tromexan), in chicks with experimentally produced atherosclerosis. The animals were divided into four groups. The first group was fed plain mash; the second received a mash containing 0.5% cholesterol; the third received, in addition to cholesterol, 1 mg. of Tromexan; and the last group was kept on mash supplemented by 1 mg. of Tromexan without cholesterol. The chicks were killed at intervals of 4, 8, and 12 weeks and the gross and microscopic cardiovascular changes were studied.

The first and fourth groups did not show any atheroma. Animals in the second group showed a gradual increase in size of atheromatous plaques in proportion to the duration of feeding of cholesterol. At all stages of development the lesions in the thoracic aorta were much more advanced than those in the abdominal aorta. Microscopically, the earliest change was an aggregation of foam cells in the intima. There was also proliferation of intimal reticulin and collagen possibly due to increased imbibition and deposition of lipids in the intima. The chicks in the third group also developed plaques but their size at various periods of feeding, in both thoracic and abdominal aorta, was smaller than that of group 2.

Tromexan did not enhance the severity of the lesions. The apparent inhibition produced by Tromexan as shown by the smaller size of lesion in chicks receiving cholesterol and Tromexan as compared to those receiving cholesterol alone was probably due to its antagonizing of prothrombin leading to a lowered blood thrombin content. Tromexan given alone did not produce any atheromatous changes. The difference in size of the plaques in the thoracic and abdominal aorta at same periods of

feeding may have been due to the action of structural and biochemical tissue factors which are present in the vessel wall and are important in the presence of altered serum composition in the development of these lesions and are also responsible for the difference in intensity and extent of atherosclerosis in different arterial trees.

The effect of Tromexan was also studied on serum lipids, proteins, and lipoproteins in experimental atherosclerosis of chicks. Marked biochemical changes were noted at different periods in the serum of these animals. Cholesterol feeding was associated with marked hypercholesteremia. Those animals receiving cholesterol showed hyperglobulinemia of the alpha-2 and beta fractions with beta lipoproteinemia. Administration of Tromexan for 12 weeks caused a slight increase in serum total cholesterol and lipid phosphorus and lowered the free cholesterol level. At 4 weeks, alpha-2 and beta globulins were reduced but at 12 weeks of drug feeding, the alpha-2 fraction was increased and the alpha/beta lipoprotein ratio showed an increase due to a relative increase in alpha lipoprotein. The increase in total cholesterol after cholesterol feeding was not prevented by Tromexan, but the level of free cholesterol was lowered with a rise of the ester fraction. The beta globulin level showed relative reduction in cholesterol-fed chicks who were given Tromexan while continued feeding of the drug raised the alpha-2 globulin level. The increase in alpha/beta lipoprotein ratio may have been due to stimulation of the active factor, lipoprotein lipase. This action is similar to the action of heparin.

Coronary Artery Disease and Cor Pulmonale.—R. M. Kasliwal and co-workers (*Indian Journal of Medical Sciences*, vol. 13, July, 1959) stated that they frequently observed patients with cor pulmonale co-existing with coronary heart disease in the form of ischemia, bundle-branch block, or myocardial infarction. These lesions were detected on routine ECG's. They were painless from the start and the patients were unaware of the cardiac damage. No history of chest pain could be elicited. A mild degree of systemic hypertension was frequently observed in patients with severe cor pulmonale. The authors reported a series of six selected patients with cor pulmonale who had electrocardiographic evidence of coronary disease. Three of these showed myocardial infarction, one showed left bundle-branch block, one showed myocardial ischemia, and one had evidence of left ventricular hypertrophy and strain.

Although coronary artery disease and cor pulmonale occur in the same age group, the two are believed to be of independent origin by some authors, but the anoxia produced by the presence of cor pulmonale is likely to aggravate the coronary lesion. There is also diminished blood flow through the coronary vessels, which increases the anoxia and leads to coronary artery disease. Clinically these cases are difficult to diagnose because of the absence of pain. Electrocardiographic findings are helpful but they can also be confusing; only autopsy reveals the full damage particularly in a patient with cor pulmonale whose dyspnea is out of proportion to the extent of his pulmonary lesions.

Plasma Protein Levels of Healthy Medical Students.—Best and Vaidya (*Indian Journal of Medical Sciences*, vol. 13, July, 1959) estimated the plasma protein levels in 70 students (55 men and 15 women) between 18 and 23 years of age. The blood samples were collected within two hours after breakfast. All the students were in good nutritional status. Most of them were used to a vegetarian diet and those who were nonvegetarians took meat only occasionally. About 8 oz. of milk was consumed daily by all. No significant difference in the levels of plasma proteins was detected due to diet. The total plasma proteins in the men averaged 7.11 Gm. per 100 ml. In the women it averaged 6.94 Gm. per 100 ml. The mean albumin concentration for the men was 4.20 Gm. per 100 ml. and for the women 4.0 Gm. per 100 ml. The values for mean total globulin were 2.99 Gm. per 100 ml. in the men and 2.87 Gm. per 100 ml. in the women. The values for albumin for both sexes were a little lower and those for globulin a little higher than those obtained by other workers.

Pulmonary Arteriosclerosis.—R. K. Goyal and co-workers (*Indian Journal of Medical Sciences*, vol. 13, July, 1959) stated that a high incidence of emphysema and consequent cor pulmonale has been reported in a northern state of India while others found much pneumoconiosis in the nonindustrial population from the same area. As lesions of pulmonary vessels are often associated with cor pulmonale, the authors studied lungs from 127 autopsies and examined 152 pulmonary arterioles with variable lesions. Marked intimal thickening was found in 17, medium in 33, and slight in 29 vessels. Five showed thrombosis with recanalization. Thickening of adventitia and intima was associated with moderate carbon pigmentation in 10, moderate medial thickening in 27, and slight medial thickening in 2 vessels. Both intima and media were thickened in 13 vessels, 9 showed atheroma, 2 had evidence of arteritis, and 5 had no thickening.

Thus, a large percentage showed thickening of the vessel wall and the lesions could be classified as (1) those due to pulmonary hypertension; (2) those produced by pulmonary hypertension and abnormal proliferation of intimal fibrous tissue; and (3) endarteritis obliterans. This material came from autopsies of persons who had had a wide variety of such unrelated diseases as cirrhosis, nephritis, and malignancy, but an overwhelming majority had varying degrees of pulmonary lesions in the form of

interstitial pneumonitis, emphysema, chronic venous congestion, fibrosis, and edema which were probably responsible for the changes in the walls of pulmonary vessels. Experimental confirmation was sought by intrapulmonary injection of dust into guinea pigs who developed definite thickening of some of the pulmonary arterioles after three months Similar results were obtained with intraperitoneal injection of local dust and silicon dioxide, a larger number of vessels being affected when the number of injections was increased.

In rabbits a single large dose injected into the lung caused thrombosis and a smaller number of injections of dust led to moderate thickening of the vessels. Inhalation of dust for varying periods also produced changes in vessel walls in rabbits and guinea pigs. The animals were made to inhale finely powdered wood charcoal as the urban population has to inhale a lot of carbon particles. Similar vascular changes were produced after about 26 days of inhalation. Inhalation of a mixture of dust and charcoal caused marked thickening. Intrapulmonary and intraperitoneal injections of silicon dioxide led to arteriolar necrosis and thrombosis in most of the rabbits subjected to these injections. To study the action of infective agents on the arteriolar walls, sublethal injections of Escherichia coli were given intraperitoneally when no thickening of pulmonary vessels was noticed, while a few arterioles were found thickened after intraperitoneal and intramuscular injections of tubercle bacilli. The important cause of cor pulmonale in the cases studied was inhalation of dust leading to medial muscular hypertrophy which in turn led to pulmonary hypertension.

Mammary Carcinoma.—Ghooi and Nigam studied the value of several tests in the diagnosis of early and doubtful cases of mammary carcinoma (*Antiseptic*, vol. 56, July, 1959). Bolen's test, based on the differences in appearance of a drop of blood allowed to dry on a slide and examined grossly and microscopically, was done in 50 patients and gave a positive finding in 40, a negative finding in 6, and a doubtful reading in 4. False-positive results were obtained in patients with liver disease and during pregnancy. Tangential roentgenography of the breast in the lateral or tangential plane showed distinctive appearances for carcinoma, benign tumors, and tuberculosis of the breast. Lipiodol and air mastography were also done in some patients but the latter was found to be too unpleasant and not very helpful.

Discharge from the nipple showed epithelial cells with retained secretions normally, while cloudy serum was obtained in duct-epithelium or papillary disease. Blood stained discharge suggested carcinoma, adenoma, or papilliferous cystic disease. Hemograms were studied in 130 patients. In 30 the total red blood cell count and hemoglobin percentage were within normal limits and 100 had some degree of anemia. The total leukocyte count was normal in 60 patients, slightly increased in 30, slightly lowered in 30, and markedly altered (the count being below 3,000 or over 25,000) in 10. The differential count showed relative eosinopenia although the lymphocytes were unaltered. The sedimentation rate, measured in 50 patients, was normal in 14, raised in 33, and subnormal in 3. Of the entire series 60% belonged to blood group B, although this constituted only 9% of the total population. The serum calcium level was raised in most patients who had osseous metastases. It showed a transient tendency to decrease in six patients treated with hormones, while hypercalcemia was an index of progression of the metastases.

Liver function tests showed a slight derangement in some patients without hepatic insufficiency. They served as a reliable index of liver involvement and in the assessment of the progression of the lesion. In four advanced cases repetition of liver function tests after three weeks of hormonal treatment showed a short-lived regression. Sternal puncture done in 40 patients was positive for malignant cells in 10. The type of primary growth did not determine the sternal metastases nor did the absence of such a spread exclude the presence of metastases elsewhere. Tissue fluid from a cancer mass showed a high protein content but no organisms or inflammatory reaction to account for this and suggested a high catabolic activity on the part of the tumor cells.

Nonoperative Treatment of Femoral Fractures.—Ohri and Hatim got excellent results with nonoperative treatment for trochanteric fractures with a case fatality rate of only 2% (*Indian Journal of Surgery*, vol. 21, June, 1959). In a series of 50 consecutive cases, they found that it was most common in the group aged 51 to 60 years, although their youngest patient was 18 and the oldest 100 years of age. Men predominated in the younger age group and women in the older. Trivial trauma accounted for 33 fractures and severe trauma accounted for the rest. Twenty-nine patients were treated by skeletal traction in a Bohler splint, eight by skin traction in a Bohler splint, five by skeletal Russell traction, and six by skin Russell traction, and two had not received any treatment but came to the hospital when their fractures had already united in malposition. Only one death (from bronchopneumonia) occurred during treatment. Of the survivors 29 had a normal gait, 10 had a mild limp, and 10 had a moderate limp after treatment; 48 had no pain and one complained of mild pain without any interference with activity or function.

Full range of movement was restored in 37 and the rest had a fair range of movements at the hip. The knee movements were full in 47 patients and fair in 2. There was no shortening of the limb in 32, a shortening of less than 1 in. in 11, and of 1 in. or

more in 6. All the patients treated by skeletal Russell traction obtained excellent results. Their fractures healed in an anatomic position with full painless range of movement and the patients were able to walk without support. Only 78.6% and 62.5%, respectively, of those treated by skeletal and skin traction in a Bohler splint obtained excellent results. None of the patients obtained poor results. Thus nonoperative treatment with the use of traction was a satisfactory procedure that could be used for all types of trochanteric fractures without selection. No further operation for removal of nail plate or screws was required and even extremely old patients were able to stand this treatment.

ITALY

Complement-Fixation Test for Brucellosis.—Gargani and Aleandri of the University of Florence (*Annali Sclavo*, June, 1959) prepared antigens by freezing and defrosting from strains of Brucella abortus and Brucella melitensis. With these antigens it was possible to differentiate by complement-fixation tests between infection by these two organisms in experimental animals. The complement-fixation test was more specific than the agglutination test and sometimes, mainly for human infection, more sensitive. The authors recommended that both reactions be used for a more exact diagnosis of brucellosis.

UNITED KINGDOM

New Medical School.—Work has begun on a new medical school at Bristol University. This new school is part of an expansion program to accommodate another 2,000 students in the next five years. It will be ready for occupation in 1962. It will contain three lecture theaters, one seating 250 students, which will also be used for medical congresses. A research block for investigations of radioactive isotopes and veterinary studies are part of the project.

Empty Beds at Plastic Surgery Hospital.—Beds are empty and equipment is idle in several wards at Queen Mary's Hospital, Roehampton, London, one of the important centers dealing with burns, skin-grafting, and plastic surgery. This is not due to lack of patients, many of whom are waiting for admission, but of nurses. Ever since the center was opened in April nearly half the beds have been empty because not enough nurses can be recruited. According to the chief nurse another 30 trained nurses are urgently required.

Drug-resistant Tuberculosis.—One of the major health problems of the future according to Prof. Frederick Heaf, of the Welsh National School of Medicine, will be drug and antibiotic-resistant tuberculosis. Deaths from pulmonary tuberculosis have declined rapidly to 4,000 a year, 20% of what they were a few years ago. This figure is low in comparison with the 29,000 deaths from bronchitis, 84,000 from coronary disease, and 20,000 from lung cancer, but this position may not be maintained if drug resistance increases. Professor Heaf advocates the immediate establishment of laboratories where drug resistance can be measured by a standard technique that can be used throughout the world. He suggests that a register of drug-resistant persons with tuberculosis be kept in every country. Attempts should be made to render them noninfectious, or if this cannot be done to reduce the virulence of the organism. Until new drugs or antibiotics are forthcoming such patients should be segregated from the rest of the population in industrial colonies, and their families should be supported. The highest mortality from tuberculosis in Britain is now in elderly men and young women. The Minister of Health is urging local health authorities to keep their registers of cases up to date.

Mannomustine.—It has been claimed by Hungarian workers that a complex of nitrogen mustard and mannitol, known as mannomustine or Degranol is more effective than nitrogen mustard itself in the treatment of leukemias and the reticuloses because it is more readily diffusible. Barlow and co-workers reported the results of a preliminary trial with the drug in 45 patients who had polycythemia, leukemias, and reticuloses (*Lancet* 2:208, 1959). They injected 100 mg. of the drug intravenously daily or on alternate days, the required dosage varying from patient to patient and with the particular disease. Twelve patients with chronic myeloid leukemia were given an initial course of 0.8 to 1 Gm. in single doses of 100 mg. while the leukocyte count was 80,000 to 150,000 per cubic millimeter and 1.2 to 1.8 Gm. when the initial count was over 200,000. Although moderate symptomatic improvement occurred in all patients between two and six weeks after the beginning of treatment, mannomustine was not considered to be as effective as the drugs at present in use, such as busulfan (Myleran), demecolcine, or nitrogen mustard hydrochloride. Temporary remission occurred in 83% of the patients with acute leukemia treated with mannomustine and prednisolone. Treatment appeared to be of value, particularly in the monocytic type, if the initial leukocyte count were much increased.

Mannomustine was found to be of some use in the treatment of chronic lymphatic leukemia, Hodgkin's disease, giant follicular lymphadenopathy, reticulosarcoma, multiple myeloma, and polycythemia. Complete regressions of lymphadenopathy and/or splenomegaly were obtained in 42% of the patients with Hodgkin's disease, and partial regression in the remainder. Although it had no effect on the final outcome, mannomustine appeared to relieve pain in 40% of the patients with advanced

carcinoma with multiple secondary deposits. It produced severe marrow depression. Toxic effects from mannomustine were severe. Nearly 50% of the patients suffered from anorexia, nausea, or vomiting, particularly if more than 100 mg. was given. Some relief from these side-effects was obtained by adding 1 Gm. of ascorbic acid to the solvent used for the drug, and by the simultaneous administration of chlorpromazine. Anemia and leukopenia occurred in 33% of all patients and thrombocytopenia in 41%. There were painful local effects in some patients.

Supply of Drugs to Hospital Patients Excessive.—The Ministry of Health, in response to inquiries by the Central Middlesex Group Hospital Management Committee, has issued a statement urging hospital doctors to prescribe smaller quantities of drugs to patients when they leave the hospital to be treated by their own physicians. The matter arose because a patient who was discharged with more than 900 tablets of a potentially dangerous drug was found to be giving them away to children. Hospitals are now reviewing the supply of drugs in bulk to patients when they leave the hospital and when they are treated as outpatients. It is suggested that not more than seven days' supply of drugs be given to patients on discharge. It is the practice of some hospital doctors to issue a prescription valid for three months, with the patient calling at the hospital pharmacy every month for supplies. The hospital doctors argue that the patients may not visit their own doctors and that treatment might therefore be interrupted.

On the whole, general practitioners are more cost-conscious than hospital doctors because their prescriptions are checked by executive councils, and they can be questioned, or even fined, for what is considered to be excessive prescribing. The hospital doctor is free from this form of bureaucratic control. The Ministry of Health considered that while the discharge of a patient must rest with the hospital doctor, the return of the patient to the general practitioner should be considered as soon as possible if further treatment is needed after the patient leaves the hospital. Patients should not be treated as hospital outpatients if they could reasonably be referred to their general practitioner.

Shortage of Medical Teachers in Far East.—Because of the shortage of teachers of medical subjects in Indian, Pakistani, and Burmese universities and colleges, the Commonwealth Relations Office is appealing to British doctors to take short-term appointments in these countries. A two-year period is suggested. Sir George McRobert, who is medical adviser to the office, said that there are 20 vacant professorships in the countries mentioned. Readers and senior lecturers are urgently required on a temporary basis, and recently retired professors and teachers are being sought. Teachers are particularly needed in anatomy, physiology, pharmacology, pathology, bacteriology, and biochemistry. The salaries offered compare well with those obtainable in Britain, and a nontaxable allowance is given as an added attraction. The British council is advertising for occupants for seven vacant chairs in Baghdad University College of Medicine. In this university, as in some others in the Middle East, teaching is in English.

Prof. U. K. Sheth, of Bombay, speaking at the Second World Conference on Medical Education, said that there are 50 medical schools in India, and by 1965 the number is to be raised to 67. There is, however, an acute lack of teachers in these schools, particularly in the preclinical subjects. The staffs are either superannuated or young and immature. In clinical subjects the problem is complicated by the large amount of both inpatient and outpatient work, which leaves little time for teaching. Some help is being obtained from the Rockefeller Foundation.

Danger of Breast Abscess.—Hutchinson pointed out that in Britain breast abscesses may be responsible for the spread of infection in general hospitals (*Brit. M. J.* 2:277, 1959). Most of them occur in the puerperium, and if the confinement takes place in a maternity hospital or unit the responsible organism, Staphylococcus aureus, will most often be one of the antibiotic-resistant types. The abscess does not usually occur until some time after discharge from the hospital, and then the patient is usually sent to the surgical ward of another one, there to spread the resistant organism. Seventy-five strains of Staph. aureus were isolated from pus obtained at operation on 75 patients with a breast abscess who were sent to a general hospital. The antibiotic sensitivity to penicillin, streptomycin, chloramphenicol, the tetracyclines, and erythromycin was tested, and phage typing was done on 70 of the 75 strains. Patients were carefully questioned as to whether the abscess was puerperal, whether the confinement was in a hospital, and whether antibiotic treatment had been given previously.

Only 11 of the 75 strains were sensitive to all antibiotics. Forty-six came from patients with a known history, and 17% of them were sensitive to all antibiotics. Of the nonpuerperal strains 75% were sensitive to all antibiotics and 25% were resistant to penicillin alone. Of the puerperal strains only 5% were completely sensitive and 58% were resistant to penicillin alone. The difference between the number of strains sensitive to penicillin in the puerperal and nonpuerperal groups was highly significant, and suggested a fundamental difference in the origin of their staphylococci. Most of the polyantibiotic-resistant organisms belonged to phage types 80 and 52/52A/80. Hutchinson suggested that this reservoir of infection should be kept out of

general hospitals, and that these patients should be nursed in infectious fever hospitals, which are half-empty at the moment. If it is decided to give an antibiotic, penicillin should not be chosen. It may be doubted if the use of any antibiotic is advisable since it fails to cure once the abscess has formed. When patients with breast abscesses are discharged from the hospital the general practitioner should be given the sensitivity data of the organism.

New Site for Royal College of Physicians.—The Royal College of Physicians of London has received a gift of $1,260,000 from the Isaac Wolfson Foundation for the building of new premises. The present college was built in 1925 in Pall Mall by Sir Robert Smirke to accommodate 90 fellows. Now there are 900 fellows and 4,000 members. A site has been acquired in Regent's Park and the generosity of the Wolfson Foundation together with the money from the sale of the existing building not only will provide for a new building but will enable the college to extend its activities. The Wolfson Foundation was established in 1955. The grant to the Royal College of Physicians is the largest the Wolfson Foundation has yet made.

Monitoring the Heart of the Fetus and Newborn Infant.—Continuous recording of the fetal heart sounds is desirable in such conditions as trial labor, prolonged labor, or difficult birth. MacRae has constructed a continuous monitoring device for the fetal heart (*Lancet* **2**:266, 1959). A small microphone is strapped to the mother's abdomen over the area where the fetal heart is best heard and covered with plastic rubber to reduce extraneous sounds. The microphone is connected with a soniscope, which selects and amplifies the heart sounds, which are received through earphones and tuned to their optimum volume. The sounds can be picked up either by the latter or by a loudspeaker, which is adjusted to select the low-frequency sounds of the fetal heart. Toward the end of the second stage of labor the microphone has usually to be brought to the midline above the pubis because of rotation of the shoulders, and this allows recordings to be made until the head is crowned. Tape recordings can be made of the heart sounds or they may be recorded phonographically and a visual record obtained. Systole and diastole can then be accurately measured. The fetal heart sounds can be relayed outside the labor ward so that simultaneous check can be made on several patients.

MacRae used the monitoring device in cases of maternal complications during labor, when there was fetal distress, during the administration of oxytocin injection in labor, during forceps delivery, and whenever there was cause for anxiety. The instrument revealed reflex fetal kicks and tumultuous movements of distress, and during forceps delivery it could guide the strength and duration of traction. MacRae considered that continuous monitoring of the fetal heart is essential in the second stage of labor, when uterine contractions are more powerful and the fetal brain is subject to the stress of molding. Fetal distress may suddenly appear and timely warning of this is given by observing the heart sounds. In addition it is claimed that the cardiophone can play an important part in resuscitation of the newborn infant, when respiratory failure puts a strain on the heart, in following the progress of the baby born after a difficult labor, and in monitoring the heart of the newborn infant during exchange transfusion, which imposes an extra load on the heart, especially in premature infants or babies in shock.

Griseofulvin.—Cochrane and Tullett (*Brit. M. J.* **2**:286, 1959) used griseofulvin in an agricultural area for the treatment of acute inflammatory cattle ringworm infections in man. The lesions were essentially nodular, boggy, exudative, circumscribed tumors studded with pustules. Frequently they were crusted and foul smelling, the neighboring lymph glands were enlarged and tender, and the patient suffered from mild malaise and fever. Several patients had acute active annular areas of ringworm. All had been in contact with cattle or farm buildings and culture from hairs or skin scrapings produced Trichophyton verrucosum. At first an initial daily dose of 2 Gm. of griseofulvin was given orally for one week and then reduced as the lesion responded to treatment. Later 1 Gm. daily was found to be adequate for resolution of the lesions, which took 12 to 21 days. Routine blood examinations and liver function tests revealed no abnormality.

Control cases in which patients were not given griseofulvin and were kept on routine standard treatment, which consisted of hot formentations, antiseptic lotions, and fungicidal ointments, took 9 or 10 weeks to clear. The most noticeable difference between the patients receiving standard treatment and those receiving griseofulvin, apart from the rapid resolution of the lesions, was the quick disappearance of general malaise, pain, and discomfort, and the early response of satellite lesions in those treated with the latter drug. In addition to these the authors successfully treated a number of patients with human ringworm due to T. rubrum, T. schoenleini, and Microsporon audouini.

Chronic Bronchitis.—Although chronic bronchitis is very prevalent in Great Britain, until recently few epidemiological investigations have been made on the disease. Fletcher and co-workers (*Brit. M. J.* **2**:257, 1959) studied respiratory function and illness in 192 London postmen and 192 female employees in the London Post Office with a view to determining the incidence of the disease and its distribution in the sexes. The employees were given a questionnaire relating to symptoms, their sickness and ab-

sence records were inspected, and their ventilatory capacity and daily sputum volume were measured. A working criterion of bronchitis that was accepted was the expectoration of phlegm on most days during at least three months of the year. It was found that the men had more cough and produced more sputum than the women, but the prevalence of other symptoms and of chest illnesses was similar in the two sexes. There was an exacerbation of respiratory symptoms with age in the men, but not in the women. These differences were only partly attributable to differences in smoking habits. The degree of phlegm production was graded according to whether or not it occurred throughout the day, and this grading correlated well with the volume of sputum produced in the first hour after waking; 55% of the men habitually coughed up sputum, compared with 21.5% of the women. Ventilatory capacity was significantly impaired in the men with cough and sputum, but not in the women.

It is possible that the differences of expectoration in the sexes were due to the exposure of the men to the polluted air of London. They worked outdoors, while the women worked indoors. The striking lack of impairment of ventilatory function in association with cough and sputum and recurrent chest illnesses in the women suggested that bronchial hypersecretion and recurrent infection have rather different consequences in the two sexes. The authors suggested that chronic bronchitis should be diagnosed in subjects with a productive cough not due to other causes, and that it should be graded, according either to its severity or to the persistence of the symptoms throughout the day or according to the volume of sputum expectorated. They considered that disability from impairment of ventilatory capacity or recurrent illness should be regarded as complications, and not as essential features of bronchitis, as it is important to recognize the disease before it has resulted in disability.

Larger Babies.—A survey undertaken on behalf of the Ministry of Health at the request of the British Pediatric Association and covering nearly 20,000 children in 11 urban and rural areas of England and Wales showed that the average weight at birth is increasing. The average weight has increased from 7 to 7.53 lb (3,175 to 3,345 Gm.) for boys and 7.2 lb. (3,245 Gm.) for girls (Ministry of Health Reports on Public Health and Medical Subjects No. 99, Her Majesty's Stationery Office). The standards of normal weight in infancy accepted hitherto were based on data collected many years ago. The Ministry report suggests that in infant welfare clinics, hospitals, and general practice the revised standards should be used. The largest proportion of underweight births occurred among the children of unskilled workers. The largest proportion of high-weight births was in babies born of parents in the professional and managerial classes.

The birth weight was found to rise from the first-born to those born later. In the survey four phases of growth could be distinguished in children from birth up to the age of 3 years. For the first four weeks growth was variable. A rapid increase occurred up to the age of 4 months, when the average boy's weight was 14.5 lb. (6,520 Gm.) and the average girl's was 13.75 lb. (6,152 Gm.). Then the rate slackened off. At one year of age the average weights for boys and girls were 23 and 21.5 lb. (10.4 and 9.5 kg.) respectively. Then growth took place at a fairly uniform rate until at 3 years of age the average boy weighed 32.5 lb. (14.7 kg.) and the average girl 31.5 lb. (14.3 kg.). This gain in weight, except in the first few months, was largely independent of the birth weight. It was in the first few months of life that the child who was underweight at birth grew more rapidly than the child of normal birth weight.

Perceptual Isolation.—Much evidence suggests that continual sensory bombardment is necessary for the maintenance of consciousness, awareness of the subject's relationship to his environment, and intelligent adaptive behavior. Smith and Lewty tested normal volunteers isolated as far as possible from all perceptual stimuli (*Lancet* 2:342, 1959). To eliminate all sensory input was manifestly impossible, but ingenious devices were used to reduce it to a minimum. The subjects were kept in cubicles suspended on nylon cords in isolated soundproof rooms, which were approached by a series of soundproof doors. A special ventilation plant was installed, all sound from fan motors being excluded by means of special silencers. Plugs and wiring for tape-recorders and microphones were provided between the observation room and the suspended cubicle and provision made for encephalographic recording. The subjects were allowed to rest on a bed or walk about to avoid muscle cramps. Their eyes were covered with translucent goggles to eliminate patterned vision, and their hands and arms were enclosed in cotton gloves and padded gauntlets to reduce tactile sensation. Meals were eaten in isolation. The volunteers were visited four times a day, but not at regular times, to test their appreciation of time.

Twenty volunteers (11 women and 9 men) were tested. The longest period spent in complete isolation by any one of them was 92 hours 20 minutes and the shortest was just under 6 hours. The women held out better than the men, the average isolation times of the two being 29 and 49 hours respectively. Apart from many individual reactions, a general sequence of events was observed: increasing sleep, followed by restlessness and agitation, followed by thinking difficulties, and finally panic. Thinking became disordered in all those who survived the test for any length of time. In many, concentration was completely lost and in 12 of the subjects disordered

thinking produced fear and panic. Attacks of unbearable anxiety, tension, or panic were the main reasons for abandoning the test, which all subjects could do voluntarily by pressing a button.

All became agitated and restless, both subjectively and objectively. Appreciation of time was lost, most of the subjects overestimating it. Body image disturbances, particularly of the head and arms, occurred in seven of the subjects, and dreams, which were frequent, reached a nightmare intensity in five when tension and anxiety were mounting. Irritability was observed in only two subjects. The amount of time spent in sleep was correlated with the ability to spend a long period in isolation. The appetite was good at first, but progressively deteriorated in those who spent a long time in isolation.

A psychiatric questionnaire given to all the subjects revealed that the placid and calm person with an intelligence level of, or somewhat below, average is more likely to submit to prolonged sensory deprivation. Two subjects who abandoned the test after five hours were anxiety-prone and worrying personalities. Smith and Lewty believe that sensory deprivation is an important psychiatric tool.

BCG and Vole Bacillus Vaccines.—A controlled clinical trial of BCG and vole bacillus vaccines in the prevention of tuberculosis was started in 1950 under the direction of the Medical Research Council, which published its first report in 1956. The second report appeared in the *British Medical Journal* (2:379, 1959). There were 56,700 participants originally in the trial, all of them children aged 14 to 15½ years and about to leave school. They are now aged between 21 and 24 years. The children were initially tuberculin-tested and had a roentgenogram of the chest. Those found to have active tuberculosis were excluded from the trial. Those with normal chest films, but a positive tuberculin-test, were followed up in the same way as those in the vaccinated and control groups. The tuberculin-negative children were randomly divided into vaccinated and unvaccinated control groups. About 90% of those taking part in the trial were subsequently contacted personally by Medical Research Council teams, through the mail, or through National Health Service or armed forces physicians. All patients with definite and suspected cases of tuberculosis were examined by independent doctors for final diagnosis; to avoid bias the doctors were unaware of the history of each subject.

This second report gives the results for all participants who have been in the trial for five years, with preliminary but incomplete data up to seven-and-a-half years. The annual incidence of tuberculosis in the BCG-vaccinated group was 0.38 per 1,000 compared with 2.29 per 1,000 among those in the tuberculin-negative unvaccinated group who were admitted to the trial concurrently. This represents a reduction, attributable to vaccination, of 83%. Over the same period the annual incidence of tuberculosis in the vole bacillus–vaccinated group was 0.33 per 1,000 compared with 2.62 per 1,000 among the tuberculin-negative unvaccinated group —a protection rate of 87%. The vole bacillus was not associated with the development of lupus vulgaris at the site of vaccination, a complication which had been reported previously. The degree of protection with both BCG and vole bacillus vaccines was similar for tuberculous pleural effusion, pulmonary tuberculosis, and hilar gland enlargement. Four cases of tuberculous meningitis and four of miliary tuberculosis were found among the negative unvaccinated participants, but none among the vaccinated. There was a suggestion that the lesions in the vaccinated subjects were less extensive, judged radiologically, and less severe, judged clinically, than those in the negative unvaccinated subjects.

The trial has thus shown that BCG vaccine given to children 14 to 15½ years of age confers appreciable protection against tuberculosis, lasting for at least five years and possibly longer. As tuberculosis occurred to a large extent in children with a positive tuberculin test but no radiologic evidence of infection at the beginning of the trial, it is suggested that perhaps the vaccine might be given at an earlier age, when fewer children are infected. Since the beginning of the trial the proportion of tuberculin-positive children has fallen rapidly in most areas in Britain. So far relatively few children in the country have been immunized with BCG vaccine.

Sickle-Cell Disease.—Sickle-cell disease is characterized by an abnormal hemoglobin molecule, which in its reduced form aggregates to form a gel and distorts the shape of the red blood cell. This condition, which is a cause of anemia and bizarre symptoms, particularly in pregnancy and conditions of stress, has hitherto been reported only in the United States and Africa. Five cases seen in a London hospital in West Indian and African immigrants were described by Diamond (*Lancet* 2:322, 1959). All the patients were Negroid, and in all there was mild to severe anemia, sickling of the erythrocytes at reduced oxygen tension, numerous target cells in the peripheral blood film and decreased osmotic fragility of the red blood cells. Four of the patients were women and in all of them the condition presented as an anemia associated with pregnancy or the puerperium. The disorder often remains undiagnosed because the hemolysis that occurs is compensated by increased activity of the marrow. An additional demand on reserves (in these four patients it was pregnancy) drew attention to the anemia. The fifth patient was a man whose presenting complaint was sciatica. Electrophoresis of the hemoglobin confirmed that all five patients' symptoms were examples of sickle-cell hemoglobin-C disease.

CORRESPONDENCE

VASCULAR ACCIDENTS ASSOCIATED WITH NECK MANIPULATION

To the Editor:—The article entitled "Vascular Accidents of the Brain Stem Associated with Neck Manipulation" by Green and Joynt, in THE JOURNAL, May 30, 1959, page 522, brought back to my mind a comparable series of three patients, all in the same family, who were "treated" by the same chiropractor. Oddly enough, one patient, a 24-year-old woman, certainly had an onset of multiple sclerosis, and the chiropractor was consulted because of numbness of an upper extremity. After the initial manipulation by the chiropractor there was a complete paralysis of the entire extremity, dizziness, vomiting, slurred speech, and visual disturbances. Three weeks prior to this, the mother of the patient was manipulated by the same chiropractor, who "adjusted the neck vertebrae," with a resulting paralysis of both upper extremities and a similar group of symptoms. Two months after the daughter recovered the father of the patient was manipulated by the chiropractor and also developed similar symptoms. In all three patients there were positive x-ray findings and spinal fluid disorders. The parents made complete recoveries, but the daughter has had several exacerbations and remissions of her multiple sclerosis in the past 12 years and still has a paretic left arm.

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EXCHANGE TRANSFUSION FOR ASPIRIN POISONING

To the Editor:—Dr. Sterne's article "Exchange Transfusion for Aspirin Poisoning" in THE JOURNAL, Aug. 15, page 1924, requires comment. We agree with the author that aspirin poisoning is a real danger in infancy and that exchange transfusion has a place in therapy, but we cannot agree with the management of the presented case. It is stated that the child received 0.75 Gm. of aspirin in the preceding 48-hour period. Assuming that the child weighed 10 lb. (4,536 Gm.), which seems reasonable in light of the 100-cc. blood transfusion and stated age of 6 weeks, this does not represent a toxic dose when given over a two-day period. Nelson's "Textbook of Pediatrics" states that a dose of about 150 mg. per kilogram given over a short period of time represents a toxic dose. Further proof that the level in all probability was not toxic is the statement that the blood salicylate level was 23 mg. per 100 ml. in this dehydrated patient. Toxicologists give 30 mg. per 100 ml. as a toxic level. It is stated that the blood carbon dioxide level was normal, and a urinary or blood pH is not mentioned.

It is significant that after intravenous fluid therapy the pH had risen to 7.9, a level that most textbooks state is incompatible with life. At this time two exchange transfusions were performed and the child was reported as improved. The exchange transfusions helped to treat the child's congestive failure by removing 110 cc. of blood and lowering the elevated venous pressure and no doubt correcting the iatrogenic acid-base imbalance. Since the blood salicylate level was precisely the same after two exchange transfusions, despite the marked clinical improvement in the patient, it seems unlikely that the original symptom complex was due to salicylism. We believe that when exchange transfusion is used to correct iatrogenic disease, it is the responsibility of the author and the journal to report it as such.

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The above comment was referred to the author of the article cited, and he has submitted the following reply.

To the Editor:—In cases of poisoning in infants, it is generally conceded that the exact amount of the toxic substance ingested is open to question. The mother was somewhat vague as to the exact amount of aspirin given this infant. As stated in the article, the salicylate level before the first exchange was 35 mg.%, fell to 29 mg.% thereafter, and to 23 mg.% only after the second transfusion. Intravenous fluid therapy consisted of 5% dextrose solution in distilled water and a whole blood transfusion. No alkali was given so that this perhaps was not an iatrogenic acid-base imbalance, as suggested by Drs. Oski and Salitsky. The whole blood transfusion was given in an attempt to buffer the acid-base relationship and also because of a mild anemia (a hemoglobin level of 10 Gm.% despite the dehydration), the cause of which was not ascertained.

It was my impression that the exchange transfusions had aided in correcting the acid-base imbalance as well as in reducing the salicylate level from 35 to 23 mg.%. The dramatic improvement after the exchange transfusions led me to believe that such therapy was beneficial. Whether this was due to the correction of the acid-base imbalance or to a reduction of the salicylate level or both is unknown. The elevated venous pressure might have been due to the vigorous fluid therapy, despite the fact that the amount given was calculated using the generally accepted criteria. It might also have been due to the infants' marked activity at the time

it was measured. Despite the fact that a deficit of 110 cc. of blood was established, the venous pressure remained at 30 cm. This deficit was decreased to 85 cc. at the second transfusion, and yet the venous pressure fell to 11 cm. The fall in venous pressure could be clinically correlated with the patient's activity.

I appreciate the interest of Drs. Oski and Salitsky but would suggest that they reread the article. I would be happy to give a detailed account of the case if they so desire and would welcome any further criticism.

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BISHYDROXYCOUMARIN TOXICITY

To the Editor:—The article by Eisenberg on bishydroxycoumarin toxicity in THE JOURNAL, Aug. 29, page 2181, requires comment. The following points are open to discussion:

There was no justification for dividing the daily dose of this anticoagulant. It has been generally recommended that the total daily dose should be taken only once in order to avoid confusion. There is no guarantee that this medicament could not have been taken five or six times during the day. Some physicians give long-acting substances only once every few days.

A dose of 200 mg. of bishydroxycoumarin is generally a large one. Most patients can be maintained on less than 100 mg. daily. When a patient needs more than 100 mg. daily, and particularly if he exceeds a weekly dose of 1,000 mg., he exhibits at least a partial resistance to the drug and another anticoagulant should be used. In such a case, very small doses of other substances will usually decrease the prothrombin time well. If, however, one continues to use an excessive dosage of bishydroxycoumarin, one takes the same risk as with large doses of insulin in resistant patients. There might be a sudden change of sensitivity to the drug.

This patient returned with epistaxis. His prothrombin time (21% of normal) would hardly be low enough to cause such bleeding. There must have been some local lesion in the nose. If, however, the laboratory test was wrong, there is practically always hematuria and cutaneous bleeding preceding epistaxis. Those symptoms were not mentioned at all, but it was noted that there was no gross or occult bleeding in the stool, a circumstance that never occurs unless one is dealing with a grossly neglected patient who has bleeding from many sources or with a patient who has coincidental gastrointestinal ulceration.

This patient was readmitted to the hospital on account of headache, but again no statement was made in regard to cutaneous and urinary bleeding. It would be most unusual to have a subdural bleeding alone, not accompanied by other signs of hemorrhagic diathesis.

A brain operation was performed without previous determination of the prothrombin time and without correction of this abnormally lowered value to normal. This is a prerequisite for all brain operations.

No clear-cut evidence was given that the inability to regain consciousness by the patient was a sequela of the bishydroxycoumarin treatment. It could just as well have been caused by the brain operation.

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The above comment was referred to the author of the article cited, and he has submitted the following reply.

To the Editor:—Dr. Eisenstadt is correct in pointing out that bishydroxycoumarin is not generally given in divided dosages and that 200 mg. per day is an uncommonly large amount. My original protocol read "50 mg. q. d."; it was misinterpreted by the editors as "50 mg. q. i. d.," or four times the intended amount, and the error was overlooked in proofreading.

Dr. Eisenstadt is misinformed in believing that a prothrombin time of 21% "would hardly be low enough to cause the nose bleeding." A number of authors have pointed out that no reliable relation can be discerned between the onset of hemorrhage and the prothrombin, bleeding, or coagulation times. While it appears desirable to maintain a prothrombin time of 15 to 25% of normal in a patient taking bishydroxycoumarin, intravascular clotting has occurred at lower and hemorrhagic diathesis at higher levels.

As pointed out in the protocol, "blood studies performed preoperatively but reported postoperatively revealed a prothrombin time of 8%." While I believe that most physicians would agree that, ideally, prothrombin time should be in the normal range before elective brain surgery, the rapid deterioration of this patient required immediate removal to the operating room. Emergency subdural decompression was in order irrespective of the patient's laboratory determinations, which, as a matter of fact, were made available as the procedure was nearing completion.

The patient's coma and subsequent death were both attributable to the effects of the subdural hematoma. Physicians experienced in the care of these patients are familiar with the observation that once coma has occurred consciousness is not always regained, even in the event of successful decompression. Postmortem study of the brain, as described in the protocol, revealed about 5 cc. of clotted blood and moderate cerebral edema. No other abnormal findings were noted.

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MEDICAL LITERATURE ABSTRACTS

INTERNAL MEDICINE

Iproniazid in Angina Pectoris: A Double-Blind Study. M. Shoshkes, E. L. Rothfeld, M. C. Becker and others. Circulation **20**:17-24 (July) 1959 [New York].

A "double-blind" experiment was performed with 4 unknowns, 2 of which were iproniazid and 2 were placebos, given separately at monthly intervals to 23 patients, aged between 52 and 85 years, with ischemic heart disease associated with angina pectoris. Hypertension was present in about half of the patients. The initial dose of one 25-mg. tablet administered twice daily was reduced satisfactorily to 25 mg. a day for those who remained cooperative until the end of the investigation. The use of iproniazid was judged effective in relieving the pain of 14 patients (64%) and of 16 patients (73%) of the series on 2 separate periods, whereas the placebos were effective in only 6 patients (30%) on 2 separate periods. The first use of iproniazid produced an increase in incidence of untoward reactions in 6 patients (27%) and by the second month in 11 patients (50%). Most of the reactions were mild in nature.

The effects of iproniazid were thus slowly cumulative, as shown by an increasing rate with time of both therapeutic effectiveness and untoward side-effects. It is likely that, except for a possible specific hepatotoxicity, other reported side-effects were manifestations of overdosage. The drug also produced a mild hypotensive effect, as well as an elevation of mood, and aided in maintaining body weight. There was no change in the clinical course or in the progression of the primary heart disease. The authors recommend a daily dose level of iproniazid of no more than 50 mg. Doses of over 50 mg. a day should be used only initially and not in ambulatory patients. When a therapeutic effect is achieved, the maintenance dose of the drug should be continually reduced in step-like fashion at 1-or-2-week intervals until the minimum effective dose is found for the individual patient.

The place of publication of the periodical appears in brackets preceding each abstract.

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Triamcinolone Therapy in Chronic Bronchial Asthma. L. Levin and E. Schwartz. New York J. Med. **59**:2710-2715 (July 15) 1959 [New York].

Triamcinolone (Aristocort) was administered to 50 patients as a supplement to symptomatic, local, and immunological management of intractable bronchial asthma. These 50 patients included persons of both sexes, and their ages ranged from 3 to 75 years. The administration of any other steroid was suspended before starting the triamcinolone treatment. Most patients received an initial dose of 6 to 8 mg. (in 74% of the cases) and a maintenance dose of 1 to 4 mg. (in 62% of the cases). The duration of the treatment was from 1 to 8 months for 39 patients and from 1 to 9 months for 11 patients suffering from severe asthma.

The results of triamcinolone therapy were excellent in 26 cases (52%), good in 20 (40%), and fair in 4. Excellent results meant that the patients became entirely free of asthma symptoms and remained so; good results meant that the patients were fairly free of symptoms, with only an occasional recurrence; fair results meant that the patients experienced relief in the severity of their symptoms and felt satisfied even if there remained some wheezing. Twenty patients in the excellent-result group, 13 in the good-result group, and all 4 in the fair-result group required a daily maintenance dose of only 1 to 4 mg.; the others required a dose of 1 to 16 mg. Besides the relief in their symptoms, the patients experienced a degree of satisfaction and encouragement that helped obtain their cooperation in continuing with the treatment. Side-effects occurred in 8 patients, but they were not severe enough to necessitate discontinuance of the therapy or a decrease in the dosage. Triamcinolone was found to be a useful drug in the management of chronic intractable asthma, especially because of the comparatively small doses required and the infrequency of side-effects.

Experiences with Tolbutamide in a Diabetic Clinic. J. Levine, N. T. Gottlieb and M. Tischler. New York J. Med. **59**:2567-2569 (July 1) 1959 [New York].

Studies were carried out with the oral administration of tolbutamide for from 8 to 12 months to 77 patients with diabetes, at the diabetic clinic of Coney Island Municipal Hospital. Only those patients were selected for this study who used 40 units or less of insulin daily, who had no history of repeated ketosis or acidosis and no significant renal or hepatic dysfunction, and who responded to a

loading dose (tolerance test) of 3 Gm. of tolbutamide by a 25% or greater fall in the fasting blood sugar 4 hours after administration of the dose. These patients were given 3 Gm. of tolbutamide (6 0.5-Gm. tablets) in divided doses for 3 days; 2 Gm. (4 tablets) in divided doses for the next 3 days; and 1 Gm. (2 tablets) on the 7th day. Insulin dosage was gradually reduced over a period of 4 days as tolbutamide therapy was instituted in some patients requiring more than 25 units of insulin, so that by the 5th day insulin was withdrawn. The maintenance dose was then adjusted at from 1 to 4 tablets of tolbutamide daily, depending on the follow-up studies on urine and fasting blood sugar, and on the well-being of the patient. No change was made in the regimen other than the substitution of tolbutamide for insulin.

The observations showed that in several patients who responded well to the test dose the diabetic control was not maintained by tolbutamide. Eight such patients were returned to insulin therapy, and were considered failures. In the remaining 69 patients the diabetes was well controlled or improved. There was no evidence of toxicity in any patient. The authors believe that the improvement obtained in diabetic control in this series should not be attributed to the effect of tolbutamide alone, but also to the fact that this hypoglycemic agent can be taken easily, and that, therefore, the patients used it regularly.

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The Toxico-Cancerous Syndrome: Its Value in Early Diagnosis and Immediate Prognosis. M. L. Gratacós. Semana méd. **66**:873-876 (June 25) 1959 (In Spanish) [Buenos Aires].

The author presents his concept of the toxicocancerous syndrome developed from observation of cancerous patients at various stages. This syndrome is characterized by comparative tachycardia, i. e., tachycardia without any elevation of temperature or any alteration in respiratory rhythm and blood pressure. A table containing the average pulse and temperature values in 42 patients with cancer of different types and localizations shows this negative correlation between tachycardia and temperature. The pulse frequency varies from 64 to 130, while the temperature varies from 35 to 38 C (95 to 100.4 F), without any correlation in any individual case. These average figures were obtained by taking the temperature and counting the pulse approximately 52 times for each patient (in the morning, at noon, and at night). It is the author's conclusion that the combination of tachycardia, normal temperature or hypothermia, normal blood pressure, and normal respiratory rhythm has a diagnostic and prognostic meaning in cancer. As a diagnostic criterion this syndrome should alert the physician to the possibility of a cancerous condition and call for immediate confirmation by glycoprotein determination. As a prognostic criterion, the greater the difference between pulse and temperature, the more serious is the patient's condition. The lowest condition is indicated when the pulse exceeds 110, while the temperature falls below 36 C (96.8 F). As a palliative treatment of the syndrome, the administration of antitoxins, liver extracts, carboxylase, and vitamins, as well as blood transfusions, are recommended.

The Influence of Chemotherapy on Survival in Acute Leukemia: Comparison of Cases Treated During 1954 to 1957 with Those Treated During 1947 to 1954. A. Haut, S. J. Altman, M. M. Wintrobe and G. E. Cartwright. Blood **14**:828-847 (July) 1959 [New York].

The authors report the longevity, reckoned from the symptomatic onset of acute leukemia, as well as from the initiation of treatment, and observed in a group of 89 patients who were treated at the University Hospital in Salt Lake City, between 1954 and 1957. They have compared their findings in this group of patients with those in a similar group of 78 patients treated at the same hospital between 1947 and 1953, i. e., before the availability of chemotherapeutic agents. The median survival of all patients, considered as a unit, was increased from 3 to 6 months, as measured from the date treatment was begun. The change was found to be as statistically significant as it was clinically important. The longer survival observed in the group of patients treated between 1954 and 1957 correlated with the more general administration of 3, rather than 2, chemotherapeutic agents, such as mercaptopurine, steroids, and folic acid antagonists. The significant factor, therefore, appeared to be the number of effective agents administered, rather than the use of any one in particular.

On analysis, improved survival was statistically proved only for patients with lymphoblastic leukemia; for these the median survival was 10 months after the symptomatic onset of leukemia and 7½ months after the institution of treatment. Within this group, there was an even greater improvement for those whose leukocyte values immediately before the institution of therapy were less than 10,000 per cubic millimeter; 50% of these patients lived more than 12 months after treatment was begun. The reason for the exceptional longevity of patients with the lower pretreatment leukocyte values is unknown. It appears that one can attribute at least part of the improvement to therapy. The type of statistical analysis used presents the minimum figures for improvement in median survival. When the ultimate longevity is known for the 17% of the patients surviving at the closing date of the study, an additional small increase may be found. The relative inefficacy of chemotherapy in myeloblastic leukemia should be a signal for greater screening of new agents in this type of tumor.

The Association of Peptic Ulcer with Hereditary Hyperparathyroidism. C. E. Jackson. Gastroenterology 37:35-37 (July) 1959 [Baltimore].

The author reports on a family in which hyperparathyroidism was present in at least 2 members, a 31-year-old man and his 53-year-old father. These 2 patients and, in addition, a paternal uncle and his daughter had peptic ulcers. Although further investigation of this family did not reveal any additional definite cases of hyperparathyroidism, the occurrence of several cases of peptic ulcer in a family in which hyperparathyroidism was present in at least 2 members has suggested that the high incidence of peptic ulcer associated with hyperparathyroidism may be related to some factor in the hyperparathyroid person which brings out the underlying ulcer tendency. The high incidence of the association of these 2 diseases may be a reflection of the frequency of peptic ulcer tendency in the general population.

Serum Lactic Dehydrogenase and Serum Transaminase in Human Leukemia. G. B. Magill, F. Wroblewski and J. S. La Due. Blood 14:870-881 (July) 1959 [New York].

The authors performed estimations of serum lactic dehydrogenase (SLD) and serum glutamic oxalacetic transaminase (SGO-T) concentrations in 56 adult patients and 10 children with leukemia. Elevated SLD levels were observed in 23 (77%) of 30 adults with acute leukemia, in 7 (70%) of 10 children with acute leukemia, in 15 (94%) of 16 adult patients with chronic myelocytic leukemia, and in 6 (60%) of 10 adult patients with chronic lymphocytic leukemia. The degree of the elevation of the SLD level appeared to be significantly greater in the chronic myelocytic than in the chronic lymphocytic group. Serial determinations of the SLD level were performed for periods of from 1 to 82 weeks in 55 patients of whom 43 had elevated levels at one time or another. Of these 43 patients, 21 were adults with acute leukemia, 5 were children with acute leukemia, 12 were adults with chronic myelocytic leukemia, and 5 were adults with chronic lymphocytic leukemia. Fair to good correlation between the SLD level and conventional parameters of leukemic activity was noted in 7 (33%) of the 21 adults and in 2 (40%) of the 5 children with acute leukemia, in 8 (67%) of the 12 adults with chronic myelocytic leukemia, and in 1 (20%) of the 5 adults with chronic lymphocytic leukemia. At the present time the mechanism by which the SLD concentration is elevated in patients with leukemia is not clear. The most attractive concept as to the source of elevated SLD concentration in leukemia is that of more rapid leakage of enzyme from more fragile cells. The lack of over-all correlation between serial SLD levels and established parameters of leukemic activity has proved to be disappointing in regard to the clinical usefulness of determinations of SLD levels in leukemia.

Serum glutamic oxalacetic transaminase (SGO-T) levels were studied in 61 patients. Levels greater than 100 units were seen in only 8 patients, of whom 7 had either viral or toxic hepatitis and 1 had terminal septicemia. Other types of liver impairment, including leukemic infiltration, were associated with normal or slightly elevated SGO-T levels. If these differences could be confirmed by additional studies, a SGO-T level of more than 100 units in a patient with leukemia associated with jaundice would suggest either a viral or a toxic type of hepatitis. The presence of a normal or slightly elevated SGO-T level in a patient with leukemia associated with jaundice or other evidence of hepatic involvement would be compatible with leukemic involvement of the liver.

The Association of Nonspecific Jejunitis and Granulomatous Phlebitis in the Legs. J. A. H. Collyns. Gastroenterology 37:64-72 (July) 1959 [Baltimore].

The author reports on a 26-year-old man with jejunitis, apparently isolated as regards the gastrointestinal tract but complicated by an unusual peripheral superficial phlebitis not itself producing symptoms. There was a history of several bouts of colicky abdominal pains in the umbilical region, each of 5 to 6 days' duration. At no time had there been any diarrhea or constipation. Administration of sulfaguanidine tablets seemed to bring relief, but periodic moderately severe pains in the umbilical region persisted during the ensuing 15 months. The patient was readmitted to hospital for an attack of severe central abdominal pain with temperature up to 101 F (38.3 C), and barium meal examination revealed stasis and dilation in the proximal part of the jejunum. A nodular length of nonpulsating vessel was discovered in the position of the left long saphenous vein, midway between knee and ankle. At biopsy the vessel was regarded as a vein that had been occluded by old thrombosis.

An exploratory laparotomy was performed, which revealed severe inflammation of a segment of the upper jejunum. The serosa was covered with small white "miliary" nodules. A diagnosis of isolated segmental jejunitis, either tuberculous or of the nonspecific "Crohn" variety, was made, and it was decided to try the effect of antituberculous drugs. After removal of an apparently normal appendix the abdomen was closed. A nodular, 2-cm.-long segment of vessel complete with overlying skin was removed from midway between the right knee and ankle. Histologically the picture was that of a granulomatous pamphlebitis in a vein of moderate size. Despite active antituberculous therapy with streptomycin, aminosalicylic acid, and isoniazid, the condition of the patient did not improve, and

laparotomy was repeated 3 months after the first intervention. Thirty-nine inches of jejunum were resected, which both macroscopically and microscopically showed the classic pathological picture of regional enteritis. Postoperatively the patient almost at once became free of abdominal pain. He made a complete recovery. Although frequent thorough searches have been made, superficial vascular lesions have never subsequently been discovered.

It is felt that the vascular lesions in this patient may have constituted an unusual superficial "Crohnide" reaction, dependent on and secondary to the deep-seated intestinal inflammation. The administration of sulfaguanidine at various times during the 15 months preceding the first surgical intervention might not have been entirely innocuous in this patient. The superficial phlebitis is grouped on morphologic grounds with temporal arteritis, and clinically with the other extra-alimentary manifestations of regional enteritis. The combination of lesions is unique.

Bacteriologic Culture of the Diseased Human Liver. J. M. Stormont, J. E. Mackie, E. H. Kass and C. S. Davidson. Ann. Int. Med. **51**:17-22 (July) 1959 [Lancaster, Pa.].

The authors made bacterial cultures on liver tissue from 20 patients on the wards of the Boston City Hospital. Thirteen had cirrhosis of the alcoholic, 2 had hepatolenticular degeneration, and 1 patient each had cirrhosis of the alcoholic and acute homologous serum hepatitis, cirrhosis of undetermined type and acute cholangitis, cirrhosis of undetermined type, fatty liver, and congestive hepatomegaly. In the 12 patients with temperatures over 100 F, the fever was presumably caused by chronic pulmonary inflammation in 2, pulmonary tuberculosis in 2, and staphylococcic pneumonia, tuberculous peritonitis, acute cholangitis, miliary tuberculosis, and acute pancreatitis in 1 each. In 2 patients acute hepatic decompensation with cirrhosis and necrosis was the only evident explanation; in one of these patients this impression was confirmed at autopsy. One patient had subacute yellow atrophy which was felt to be secondary to homologous serum hepatitis. Cultures were obtained either from a Vim-Silverman needle biopsy specimen (14 patients) or by aspiration (6 patients) with use of a no. 20 spinal puncture needle. Aspiration culture was used when liver biopsy was contraindicated, i. e., when there was low blood prothrombin activity or poor patient cooperation. In the latter instances, standard biopsy technique was used, with iodine and alcohol preparation of the skin. When the stylus was removed, a 20-ml. syringe was attached, the needle was advanced into the liver, and suction was applied for about 4 seconds. A few drops of fluid were obtained and introduced into 3 to 5 ml. of the culture medium by rinsing the syringe once with sterile broth.

The culture mediums used were beef heart infusion broth with 5% horse blood, and chopped meat mediums for anaerobic cultures. The inoculated mediums were plated in nutrient agar and counted, were diluted for bacterial count, and were also incubated for from 1 to 4 days. If the incubated mediums showed evidence of growth, they were then subcultured. A loopful of each culture was also streaked on blood agar and eosin-methylene blue agar. Previous use of quantitative technique in the analysis of urinary tract infections had indicated that separation between contamination and infection may often be achieved on the basis of bacterial numbers in the urine. It is hoped that this method may also distinguish contamination from infection for liver cultures.

Bacteria were recovered from the liver in only one instance, and a colony count of over 100,000 per milliliter suggested that it did not represent contamination. The organisms were identified as Escherichia coli. The patient was a chronic alcoholic, with anorexia, weight loss, mild jaundice, and an intermittent spiking fever. A Vim-Silverman biopsy and culture were performed, and a diagnosis of mild cirrhosis with portal inflammation was suggested. Laparotomy later confirmed the presence of acute and chronic cholecystitis with common duct stones and cholangitis.

The authors feel that the data that are presently available suggest that bacteria are not ordinarily found in the human liver or portal vein blood, but that bacteria may invade the portal vein under unusual physiological circumstances, such as abdominal trauma, surgery, irradiation, shock, anoxia, or other circumstances leading to local changes in the intestinal wall. Why biliary stasis is particularly related to the retention of bacteria in the liver is not yet clear.

Cushing's Syndrome: Clinical Differential Diagnosis and Complications. L. M. Hursthal and J. B. O'Sullivan. Ann. Int. Med. **51**:1-16 (July) 1959 [Lancaster, Pa.].

The authors reviewed the records of 34 patients with Cushing's syndrome seen at the Lahey Clinic, Boston, in the hope that a better understanding of the onset of the disease and its earlier recognition would result. At the time the 34 patients (7 males and 27 females) came to the clinic, the disease was in a more advanced stage than that which the authors attempt to delineate. In general, their symptoms and signs were about the same as those published on similar groups of patients. Surgical confirmation was obtained in 27 patients (adrenal carcinoma was found in 1, adrenocortical adenoma in 5, adrenocortical hyperplasia in 19, and aberrant adrenal tissue in the pancreas in 2). The remaining 7 cases were diagnosed by the characteristic clinical signs and laboratory findings when first seen on an average of 5 years after the onset of the disease.

Inquiries about the details of onset revealed that it was rapid in 24 of the patients. Such a high incidence (71%) of rapid onset was contrary to expectation; furthermore, the rapidity of onset did not indicate the underlying etiology. A case was placed in the group with rapid onset, if the initial symptoms were rapid enough to alert both the patient and the physician. The etiological diagnosis in these 24 patients was: adrenocortical hyperplasia in 19 cases; adrenocortical tumor in 3; carcinoma in 1; adrenal tissue aberrant in the pancreas in 1. The disease began with edema of the legs and face, described as "swelling," "bloating," and "puffiness," accompanied by some other signs, such as amenorrhea, renal colic, acne, hirsutism, bruises, weakness, mental symptoms, or diabetes mellitus. Other patients complained of a sudden craving for food with increase in weight, one patient having an increase of 40 lb. in one month. In 2 cases the initial symptom was renal colic with facial edema; the edema commenced one week before the renal colic in one patient, and 2 weeks after in the other. One of these patients had had 3 attacks of renal colic at yearly intervals. It was interesting that the onset in one patient was associated with symptomatic diabetes mellitus, and that a perforated duodenal ulcer occurred in a patient with episodic onset of symptoms.

There were 10 cases with gradual onset, including 2 cases resulting from an adrenocortical adenoma, and 1 with adrenal tissue aberrant in the pancreas. The clinical manifestations began with mental changes, oligomenorrhea, gradual weight increase, hypertension, sterility, and diabetes mellitus. In commenting on possible precipitating factors, the authors say that some patients described emotional strain before the onset of symptoms. In 6 patients, initial symptoms occurred after periods of unusual stress: a change of employment in one case, after marital separation in another, during a time when 3 jobs were held simultaneously in a third, when in solitary confinement after a prison riot in a fourth, working extra-long business hours in a fifth, and during a honeymoon in the sixth patient. Another precipitating or aggravating factor was surgical or traumatic "stress." The common initial signs in cases with rapid onset and with gradual onset are listed, together with the differential diagnoses that must be considered in the presence of these signs.

Particular attention is given to edema, which is presumed to occur as a result of the tendency to hypoproteinemia, hypernatremia, and vascular fragility. The effect of the syndrome on the metabolism of calcium and protein can become responsible for pathological fractures and renal calculus. Hypertension can become a continuous problem, even when the underlying cause has been adequately treated. The well-recognized susceptibility to infections in patients with Cushing's syndrome is reemphasized. Peptic ulcer occurred in 3 of the patients. The fact that the symptoms and signs in the neurological complications of Cushing's syndrome are similar to those in the Guillain-Barré syndrome and in diabetic neuropathy is discussed.

Report of an Outbreak of Bornholm Disease, with Isolation of Coxsackie B5 Virus: Toronto, 1958. D. E. Ryder, F. W. Doane, A. Zbitnew and A. J. Rhodes. Canad. J. Pub. Health **50**:265-269 (July) 1959 [Toronto].

During an outbreak of epidemic myalgia or pleurodynia (Bornholm disease) in a Toronto suburb in 1958, a group of 16 families, comprising 27 cases of this disease, was studied. In only one family were all the members affected; in 3 others multiple cases occurred. The onset of the illness was usually acute, with temperatures up to 103 F and severe chest or/and abdomen pain. The duration was shorter in young children (about 7 days) than in older children and in adults (12 days). Complications (otitis media in one case, and mild bronchopneumonia in the other) occurred in 2 patients. Relapse occurred in 4.

Stool specimens were collected from all 27 patients and inoculated into monkey-kidney-tube culture. Virus was isolated from 21 of these specimens and identified as Coxsackie B5 in 20 strains and as Coxsackie B4 in one. Neutralizing tests were carried out on acute and convalescent serums from 10 patients who had excreted virus. The paired serums from 8 patients showed either a significant rise in, or a high level of, neutralizing antibodies in both serums. The high rate of isolation (78%) of Coxsackie B virus in this series and the results of the antibody studies, showing recent infection with the homologous virus in 8 of the 10 cases studied, confirm the results of other investigations concerning the role of Coxsackie B virus as an etiological agent in epidemic Bornholm disease.

The Mucocutaneous Lesions of Reiter's Syndrome. M. M. Montgomery, R. M. Poske, E. M. Barton and others. Ann. Int. Med. **51**:99-109 (July) 1959 [Lancaster, Pa.].

Although the triad of urethritis, conjunctivitis, and arthritis (Reiter's syndrome) is now well known, the authors feel that the high incidence of mucocutaneous lesions is not generally appreciated. In their experience these mucocutaneous lesions occur so frequently in the endemic or venereal type of Reiter's syndrome, that this type might better be considered a tetrad, consisting in its complete form of urethritis, conjunctivitis, arthritis, and mucocutaneous lesions. The authors are chiefly concerned with the character and frequency of the mucocutaneous lesions and with their diagnostic importance. In the 38 patients with Reiter's syndrome treated during a 10-year period at the Hines

(Ill.) Veterans Administration Hospital, urethritis was recognized in all but 3, and these 3 had pyuria. Conjunctivitis was absent in only 5. Arthritis was the disabling component in all the patients. The authors feel that there is difficulty in the documentation of urethritis and conjunctivitis in patients seen a number of weeks after onset of the illness. In such cases, mucocutaneous lesions, which appear 4 to 6 weeks after appearance of the urethritis, may be the factor which establishes a definite diagnosis.

In the group of 38 patients, mucous membranes of the genitalia were affected in 30; mucous membranes of the mouth, pharynx, and tongue were affected in 14 of these 30. The skin was affected in 11 of the group. In no instance was the skin alone involved, and in no patient were oral mucous membrane lesions an isolated finding. Commenting on the mucous membrane lesions of the genitalia, the authors suggest that perimeatal erosions and balanitis circinata are probably of identical nature, and were present in all 30 of the 38 patients with mucosal lesions. Twenty-three had both lesions; 4 of the remaining 7 had perimeatal erosions, while the other 3 had balanitis circinata alone. The authors describe the morphology of the various genital lesions, of the buccal and pharyngeal lesions, and of the cutaneous lesions (keratosis of Reiter's syndrome).

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The Influenza Epidemics of 1918 and 1957. M. Straub. Nederl. tijdschr. geneesk. **103**:1208-1214 (June 6) 1959 (In Dutch) [Amsterdam].

The author reviews the literature on the 1918-1919 influenza epidemic and states that several groups of investigators searched for filtrable viruses and advanced the hypothesis of a specific influenza virus. He describes studies on 42 fatal cases of virologically confirmed Asian influenza that were observed in Rotterdam in 1957. These studies demonstrated the presence of 2 distinct types of the disease. The first type was characterized by secondary infection with Staphylococcus aureus, fatal aspiration pneumonia, and a peracute course of the disease; it was seen mainly in young women and children. The second type was marked by fatal virus pneumonia and developed in patients with chronic diseases of the heart and lung. During the winter influenza epidemics of the last 10 years, no virus pneumonia was seen, but staphylococcic influenza occurred. In 1918 streptococci and pneumococci played the same role as did staphylococci in 1957. In 1918 primary virus pneumonia also occurred in previously healthy persons, and became fatal as a result of secondary streptococcic and pneumococcic infections.

The author feels that pneumotropism of the virus and the nature of the secondary infection are both responsible for the virulence of influenza epidemics. The predisposition of young women to grave complications results from the relative narrowness of their tracheas. Pregnancy predisposes to virus pneumonia. The high incidence of fatal cases among elderly patients during influenza periods is due to existing respiratory infection and a tendency to thromboembolic processes.

Studies on the Origin of Drug-Resistant Staphylococci in a Mental Hospital. A. White, T. Hemmerly, M. P. Martin and V. Knight. Am. J. Med. **27**:26-39 (July) 1959 [New York].

The authors studied the effect of antibiotics on staphylococci from 50 patients who were inmates of a mental hospital in Nashville, Tenn. Antimicrobial drugs had been used infrequently, and the staphylococci were largely susceptible. Nasal swabs were taken regularly, beginning in October, 1957, and were continued through August, 1958. The patients were given courses of treatment with erythromycin, penicillin, and tetracycline in order to judge the effect of these agents on various aspects of the staphylococcic carrier state. Erythromycin, to which all cultures before treatment were susceptible, caused a complete suppression of the carrier state, and only a few resistant strains appeared subsequently. Penicillin, to which 10% of strains were resistant before treatment, caused a drop in the carrier rate to 60%, but the fall was limited at this point by an increase in strains resistant to penicillin. Tetracycline, to which 4% of strains were resistant before treatment, caused a fall in carrier rates to 20%, at which point increase in resistant strains prevented further reduction. After treatment, the carrier rates in treated patients increased, and the frequency of resistant strains diminished. Treated noncarriers and nontreated carriers on the same ward did not change during therapy experiments. Successive treatment of patients with penicillin and tetracycline caused the appearance of a group of cultures resistant to both penicillin and tetracycline, of which a majority did not react with phage (no type). A high proportion of strains of phage type 52-80 susceptible to penicillin and tetracycline, initially present on the ward, completely disappeared after use of these agents.

Clinical Characteristics of Leptospirosis: Observations Based on a Study of Twelve Sporadic Cases. G. A. Edwards. Am. J. Med. **27**:4-17 (July) 1959 [New York].

A study of 12 sporadic cases revealed leptospirosis to be an acute, self-limited, diphasic illness with a low incidence of jaundice or significant renal damage. In the majority of cases the onset of illness was abrupt. All the patients had fever and chills, and most of them had minor gastrointestinal complaints. Since Leptospira organisms can be recovered from the blood and cerebrospinal fluid during this first phase in a high percentage of

cases, it has been designated as the "septicemic" stage. The second stage begins as defervescence, and symptomatic improvement occurs on the 6th or 7th day. Shortly after the end of the first stage there is usually a secondary rise in temperature and development of meningitis, either asymptomatic or clinical. It has been demonstrated repeatedly that the blood and cerebrospinal fluid are sterile during this stage, organisms rarely having been recovered after the 7th or 8th day. During this second stage antibodies appear in the blood in rapidly rising titer. In addition to fever and meningitis, several infrequent manifestations, such as iridocyclitis and various neurological lesions, may develop. It is proposed that this phase be designated as the "immune" stage, since manifestations are primarily due to hypersensitivity. Not all the patients had overt meningitis. Three patients had pleocytosis without any of the usual signs or symptoms of meningitis. Another patient had severe delirium, beginning on the 6th day, and, although he had pleocytosis, he was not considered to have clinical meningitis.

It was impossible to correlate the different clinical disease patterns with the leptospiral serotypes identified in these cases. There are no clinical syndromes exclusively linked with infection by specific serotypes; nor are there any serotypes which always cause the same pattern of disease. For this reason the use of special names as synonyms for infections with certain species is not justified. The diagnosis of leptospirosis should be considered in any patient with an acute illness characterized by headache, myalgia, fever, chills, and conjunctival suffusion, and in any patient in whom "aseptic meningitis" develops after an acute febrile illness of 5 to 7 days' duration. The greatest danger of infection in man is from contact with stagnant water to which wild or domesticated animals have access, but infection may result from direct contact with the urine of infected animals as well.

SURGERY

Congenital Heart Disease: III. Coarctation of the Aorta. C. J. O. Brown, B. L. Deans, J. M. Gardiner and others. M. J. Australia **1**:857-864 (June 27) 1959 [Sydney].

The authors report on 100 patients (68 male and 32 female), between the ages of 4 months and 56 years, with congenital coarctation of the aorta, seen at the Alfred Hospital in Melbourne, Australia. An attempt at surgical correction was made in 74. Two patients, a 24-year-old woman and an 8-year-old girl, proved to have inoperable disease; the adult had a narrowing of the whole length of the thoracic aorta with extensive calcification, and the child had associated patent ductus arteriosus and a large aortopulmonary septal defect. In 72 patients excision of the constricted area of the aorta was performed with the aid of anesthesia, which was induced with thiopental (Pentothal) sodium and curare after insertion of an endotracheal tube. Anesthesia was continued with nitrous oxide and oxygen, with fully controlled respiration. Trimethaphan (Arfonad) camphorsulfonate was used in 30 patients to induce hypotension; administration of the drug was started before the incision was made and was maintained until completion of the anastomosis, when the blood pressure was allowed to rise slowly. In most of the patients the blood pressure was reduced to 80 to 100 mm. Hg from the start of the operation.

Of the 72 patients, 5 died as a result of the operation. Of the 67 patients operated on successfully, the continuity was restored by an end-to-end anastomosis in 65; in 2 the subclavian artery was divided and turned down and anastomosed to the descending aorta. In 6 patients arterial homografts were used. Of the 67 patients, 6 had a normal blood pressure before the operation. In 48 of the remaining 61 patients, the blood pressure in the upper extremities was reduced to below 140/90 mm. Hg, with a corresponding rise in the femoral artery pressure. Three of these patients died subsequently. In 11 patients the blood pressure was reduced, but not to normal. Five of these had aortic regurgitation in addition to their coarctation, and 1 of these 5 required a graft. There were 2 patients in whom the blood pressure was not reduced; one of these had aortic incompetence in addition to coarctation.

The authors believe that most of the patients with coarctation of the aorta should be operated on. The best time for the operation is considered to be between the ages of 8 and 15 years, but it may be performed earlier if there is evidence of cardiac strain or severe hypertension. Most patients, aged less than 30 years, should be operated on, and one should not hesitate to operate on those above this age if the coarctation is producing symptoms, but operation is not indicated in the terminal stages of cardiac breakdown. Aortic incompetence is not a contraindication to operation, but may vitiate the result. Aortic stenosis does seem to be a contraindication unless it can be relieved at the same time or later. Hypotension induced with trimethaphan is a valuable adjunct to the operation. Interrupted sutures, with 00000 arterial silk, should be used for the anastomosis. The results of surgical treatment have proved gratifying.

Surgical Treatment of Recurrent Fibroadhesive Cerebellomedullary Arachnoiditis. J. B. Albertengo. An. cir. **24**:1-11 (Jan.-March) 1959 (In Spanish) [Rosario, Argentina].

A new operation is described, aimed at reestablishing the circulation of the cerebrospinal fluid in patients with blockage of the subarachnoid space due to severe forms of recurrent fibroadhesive cere-

bellomedullary arachnoiditis. The procedure consists in placing 1 or 2 catheters over the blocked segment of the subarachnoid space, establishing communication between the lateral ventricle, the cisterna magna, and the subarachnoid space at the level of the 5th, the 6th, or the 7th cervical vertebra according to the extension of the arachnoiditis. The ends of the catheters are sutured. The lower ends are introduced in the subarachnoid space of the cervical canal by removing half of a vertebral lamella and making a hole in the dura mater. The catheters are of rubber or polyethylene.

Four representative cases are reported. In the 4 patients decompression and liberation of adhesions gave temporary relief, followed by reappearance and aggravation of the neurological symptoms and a progressive course of the disease. In 2 patients the blockage caused by the arachnoiditis involved mainly the cisterna magna and the posterior fossa. These patients were cachectic for 3 months and in a coma for the last week preceding the operation. Two catheters were placed, one from the lateral ventricle to the cisterna magna, and the other from the cisterna magna to the cervical subarachnoid space. The patients were in normal health, without any signs of intolerance to the catheters, 10 and 4 years, respectively, after the operation. In the only child in this series, a 6-month-old infant, the posterior fossa was blocked. The catheter was placed from the lateral ventricle to the cisterna magna and the subarachnoid space under the 4th cervical vertebra. At the age of 3 years the child had normal height and weight, but did not walk, and spoke only a few words. The 4th patient had acute neurological symptoms, mainly paralysis of the legs and impotence. A neurinoma was surgically removed from the spinal canal without relieving the neurological symptoms. An operation performed 2 years later showed an enormous mass of fibroadhesive tissue which filled the spinal canal and the cauda equina. After removal of the fibroadhesive tissue, 2 catheters were placed in the subarachnoid space, one from the 12th to the 6th thoracic vertebrae, and the other from the 10th to the 3rd. The catheters in this case had perforations at 1-cm. intervals. There was a marked but temporary improvement, followed by reappearance of the neurological symptoms, including paralysis of the legs and impotence.

Occlusive Disease of the Carotid Arteries. A. Silverstein. Circulation **20**:4-16 (July) 1959 [New York].

Occlusions of the carotid arteries may be responsible for more than 20% of all acute cerebral vascular lesions. The author reports on the clinical features of 50 hospitalized patients, ranging in age from 26 to 82 years, with occlusive disease of the carotid arteries. Thirty-seven patients were males, and 13 were females. There were 28 occlusions in the right carotid artery and 20 in the left carotid artery and 2 instances of bilateral complete carotid occlusion. There was evidence of vascular lesion elsewhere in the body in 38 patients. The onset of symptoms was sudden in 36 patients and gradual in 14. Motor weakness was the commonest neurological finding, hemiparesis or hemiplegia being present in 49 patients. Carotid arteriography was performed in 47 instances; the clinical course of only 2 patients tended to progress immediately after arteriography. Transient neurological deficits after angiography of the patent carotid artery developed in 2 patients and lasted less than 24 hours.

Anticoagulant therapy was given to 14 patients; neck surgery was performed on 6; and trypsin was administered intramuscularly to 1. Seventeen patients showed a moderate neurological improvement and have maintained it. Ten patients have died, probably because of carotid occlusion. Moderate to severe degrees of atheroma formation were observed in most of the 10 specimens (6 surgical and 4 autopsy) of carotid arteries studied. The results of therapy are not presented, because the number of patients was small and the follow-up periods were brief. It is not yet known which form of therapy, anticoagulant or surgical, is to be preferred. The diagnostic methods for determining carotid occlusion, which were used in this series with significant regularity, were ophthalmodynamometry and carotid compressions. Definitive diagnosis requires arteriographic study.

Acute Pericardial Fat Necrosis: Report of a Case. M. H. Chester and J. B. Tully. J. Thoracic Surg. **38**:62-66 (July) 1959 [St. Louis].

The pericardial fat necrosis syndrome was first recognized as a clinicopathological entity by Jackson, Clagett, and McDonald in 1957, when they reported 3 cases in which exploratory thoracotomy was performed from 7 to 10 weeks after the acute onset of symptoms. These investigators emphasized that acute pericardial fat necrosis can simulate acute myocardial infarction, pulmonary embolism, or hemorrhage into a neoplasm of the lung. The roentgenographic appearance may easily be misinterpreted as a primary or metastatic carcinoma of the lung, a localized pleural effusion, pleuropericardial cyst, or mesothelioma. A consideration of this disease entity is, therefore, warranted in any patient with unexplained precordial pain, pleuritic pain in the lower chest on the left, and an associated juxtacardiac mass.

The authors present a 46-year-old man who during a severe lifting effort experienced the sudden onset of anterior chest pain and cramping epigastric pain. The pain radiated to the left shoulder and increased on deep inspiration; it became excruciating and caused syncope. The patient was hospitalized 3 days after the onset of the pain, with diagnosis

of acute myocardial infarction. He was pale, sweating, and had excruciating chest pain; respirations were rapid and shallow; blood pressure, 98/68 mm. Hg; and pulse, 126. He was unable to take a deep breath because of the exacerbation of the chest pain. Auscultation elicited normal breath sounds. An unusual, soft, low-pitched rub, however, was heard during expiration. This sound resembled the sound produced by compressing a wet sponge. It could easily be distinguished from the classical friction rub of a pericarditis. The rub disappeared on the third hospital day. An electrocardiogram was normal, except for an occasional ventricular presystole. Chest roentgenograms demonstrated a juxtacardiac mass along the anterior aspect of the left cardiac border; tomograms of the juxtacardiac mass revealed several ovoid areas of decreased density. Serial electrocardiograms and serum transaminase determinations were normal.

An exploratory operation was performed on this patient 13 days after the acute onset. A firm ovoid mass, measuring 10 by 7 cm., was identified as the pericardial fat pad. It was adherent to the anterior and lateral aspect of the pericardium and the anterior chest wall. There were also adhesions binding the lingula to the pericardial fat pad. The mass was excised by lung dissection. Histological studies on the removed tissues revealed that the changes were due to extravasation of blood, ischemic fat necrosis, and fibrosis. Moderate endarteritic changes were also noted. A traumatic etiology is a strong probability in this case.

The Clinical Evolution of Shunt-Operations for Morbus Caeruleus: Results of 150 Operations, in a Long-Term Follow-Up. C. A. Mahaim, C. L. C. van Nieuwenhuizen, H. A. D'heer and F. Slooff. Am. Heart J. 58:13-25 (July) 1959 [St. Louis].

The aim of the operations of Blalock, Potts, and Brock, used in treating the tetralogy of Fallot, is to augment the pulmonary circulation in order to increase the oxygenation of the blood. They do not correct the malformation; in fact, with the procedures of Blalock and Potts, a 5th malformation is created in a heart that already has 4. An operation which creates an artificial ductus arteriosus must, in the long run, produce overloading of the heart, but the immediate benefits of the operation, insofar as the general status of the patients and the amelioration of the cyanosis are concerned, are so evident that the usefulness of this type of operation is universally recognized. But what is the future of these patients? The authors investigated the long-term results in 141 patients subjected to 150 operations between 1948 and 1956 at the St. Antonius Hospital, Utrecht, The Netherlands. The Potts procedure was performed 88 times; the Blalock method, 42 times; the procedure of Brock, 17 times; exploratory thoracotomy, once; and 2 patients died under anesthesia before the operation was begun. In 9 of the 141 patients a second operation was performed. All living patients except one were reexamined in 1956 or 1957.

A preoperative prognosis had been made, taking into account such factors as age, hemoglobin content, electrocardiogram, and roentgenogram. The following were the most important factors that adversely influenced the prognosis: (1) the detection of malformations not corresponding to those characteristic of the tetralogy of Fallot; (2) electrocardiographic indications of a left or an extreme right ventricular hypertrophy; (3) age younger than 2½ years or older than 17 years; (4) a cardiothoracic ratio of 55% or more; (5) a hemoglobin value of more than 150% or less than 70%; (6) body weight of more than 10% below normal; and (7) presence of signs of circulatory deficiency at birth.

Patients were divided into 3 groups with regard to the aforementioned criteria. Group 1 included the patients with a good prognosis, that is, none of the 7 adverse factors were present. Group 2 included the patients with an average prognosis, one of the adverse factors being present. Group 3 included the patients with a poor prognosis because from 2 to 6 of the adverse factors were present. Of the patients who had a favorable preoperative prognosis, 90% obtained good results, one-third of which were excellent; the mortality in this group was 4%. In the patients with an unfavorable preoperative diagnosis, the mortality was 10 times greater. The favorable results obtained with the 3 operations persisted during the years following. In general, the postoperative modifications in the clinical signs, the electrocardiograms, and the roentgenograms were stabilized within the first 2 years after the operation. Some patients, even after a period of several years, had normal cardiac function, as indicated by a cardiac function test.

The optimal size of the operative shunt ranges from 4 to 6 mm. in diameter. The best results are obtained with the Potts and Blalock procedures; the Brock operation should be avoided because of a high operative mortality, probably as a consequence of the frequency of the infundibular type of stenosis in the tetralogy of Fallot.

Thrombosis of the Inferior Vena Cava. A. Buzzi, O. Fustinoni, T. J. Gutierrez and H. A. Ruggiero. Rev. Asoc. méd. argent. 73:189-195 (June) 1959 (In Spanish) [Buenos Aires].

The clinical polymorphism presented by thrombosis of the inferior vena cava may constitute a serious diagnostic problem. Besides the easily recognized cases in which a thrombophlebitis of the lower extremities extends into the iliac veins and occasionally into the inferior vena cava, there are cases in which a caval thrombotic obstruction

develops without any warning signs or symptoms. Sometimes it constitutes a terminal, asymptomatic stage which is diagnosed only at autopsy. The authors report on 5 cases that illustrate the incidence of insidious development and the potential danger of an unrecognized inferior caval thrombosis.

In the first case the patient was a 26-year-old man whose earliest symptom was sudden, continuous, and severe lumbar pain. Primary thrombosis of the inferior vena cava developed, together with deep collateral circulation. After 45 days, during which the course of the disease showed steady aggravation, ligation of the inferior vena cava was performed. One year later the patient still had edema of the lower extremities and a scant peripheral collateral circulation, but the over-all clinical picture indicated that his disease had been arrested. The second patient (a 57-year-old man) was hospitalized because of phlebothrombosis of the lower limbs. Later signs of pulmonary embolism developed, but ligation of the inferior vena cava was considered inadvisable, and the patient died approximately 3 months after hospitalization. In the case of the third patient (a 38-year-old man) the inferior caval thrombosis, complicating a bacterial endocarditis, was not discovered until autopsy. The fourth and fifth patients were 2 men, aged 51 and 54 years, respectively, who were suffering from thrombophlebitis and whose disease, after an interval of 10 years in one case and of 6 months in the other, developed into inferior caval thrombosis.

The authors stress the need for alertness to the possibility of caval thrombosis even in the absence of any signs or symptoms, and recommend the use of cavography with the purpose of confirming the diagnosis and evaluating the deep collateral circulation. From the therapeutic point of view, they recommended the administration of anticoagulants, to avoid repetition of the thrombotic accidents, and the surgical ligation of the vena cava, to avoid the ascending extension of the thrombosis.

GYNECOLOGY & OBSTETRICS

Early Endometrial Carcinoma Following Prolonged Estrogen Administration in an Ovariectomized Woman. Y. M. Bromberg, E. Liban and A. Laufer. Obst. & Gynec. **14**:221-226 (Aug.) 1959 [New York].

The authors report on a 42-year-old woman in whom an early endometrial carcinoma developed after bilateral ovariectomy which had been performed 24 years previously for torsion of an ovarian cyst. The patient had been treated for continued vasomotor disturbances with estrogens during the entire period after the operation, and a total amount of 9.2 Gm. of estrogenic substances had been administered. Fairly considerable uterine bleeding took place. An endometrial biopsy revealed glandular cystic and adenomatous hyperplasia of the uterus and early carcinoma. Total hysterectomy was performed. The postoperative course was uneventful, and when the patient was last seen, 24 months after the hysterectomy, her general condition was satisfactory, and no evidence of metastasis was found. It was noted that the patient's mother had died of carcinoma of the uterus. A synergistic effect of prolonged estrogen therapy and of a hereditary predisposition to the development of the carcinoma is suggested as a possible explanation for the appearance of the tumor in this patient.

Morbidity and Mortality of Total Abdominal Hysterectomy and Late Results in Patients Operated on for Nonmalignant Diseases of the Uterus. R. Bianco and F. Di Re. Tumori **45**:189-200 (March-April) 1959 (In Italian) [Milan, Italy].

The authors report on a study of the morbidity and mortality and late results in a group of 107 women on whom total abdominal hysterectomy for both malignant and benign disease of the uterus was performed at the Cancer Institute of Milan during 1954-1958. All the patients survived the operation. Two instances of a vescicovaginal fistula and one of an ureterovaginal fistula were the only complications of the operation. A 48-year-old woman, operated on for adenocarcinoma, and a 58-year-old one, operated on for myoma of the uterus, both presenting varices of the lower limbs, developed phlebitis from which, however, they recovered. A 67-year-old patient in poor general condition, operated on for adenocarcinoma, suffered on the 8th postoperative day from eventration which required emergency suturing. Five patients developed cystitis, which most likely was caused by the use of a catheter during the first 24 hours after the operation; this condition disappeared rapidly. The neck of the uterus was free from alterations in only 30 of the 107 patients; a hyperplasia of the basal strata of the epithelium of the portio was observed in 23 instances. Cancer of the neck of the uterus was present in 11 patients.

Late results from follow-up examinations were gathered in only 70 of the 107 cases; some patients could not be reached, and those operated on during the second semester of 1958 were not considered. None of the 70 patients presented alteration in the state of the pelvis. Five patients were suffering from dyspareunia, one of them suffering from this condition even before the operation. One patient, 65 years of age, presented a shortened vagina. The authors point out that this finding would have been more frequent had they not, in performing the hysterectomy, resected the vagina at the point where the fornices become inserted in

the neck of the uterus. The libido increased in 6 patients and declined in 5. Seven patients presented a granuloma in the fundus of the vagina, but this was easily removed in each instance. Three patients presented incontinence of urine, and 2 presented frequent episodes of cystitis.

The authors believe that total abdominal hysterectomy is the operation of choice in patients with nonmalignant diseases of the uterus, when in these patients it is not possible to perform another type of operation that could retain the function of the uterus. Total hysterectomy is to be preferred to subtotal hysterectomy—first, because the risk incurred in both operations is the same, and, second, because the high incidence of pathological manifestations connected with residual stumps after subtotal hysterectomy can be eliminated by total hysterectomy.

Foetal Wastage in Twin Pregnancy. S. H. Tow. J. Obst. & Gynaec. Brit. Emp. **66**:444-451 (June) 1959 [London].

The author reports on 408 women with twin pregnancies, who were admitted to the Royal Maternity Hospital in Belfast for delivery between 1947 and 1956. Of the 816 infants, 3 first twins were born at home, and the remaining 813 infants were born in hospital. There were 51 stillbirths (6.3%) and 49 deaths in the first week of life (6%), making a total fetal loss of 12.3%. While this figure is high, it compares favorably with the best results obtained by other workers. Antenatal, intranatal, and postnatal risks of twin pregnancy, in large measure associated with gross prematurity, contribute to this high mortality. By comparing the incidence of preeclampsia, premature deliveries, and vertex-vertex presentation in the patients who had registered for antenatal care with that in those who did not, it appeared that antenatal care and bed rest in hospital conferred striking benefits in reducing maternal complications and prolonging gestation, thus leading to a reduction in prematurity and fetal wastage. Accurate diagnosis and careful antenatal supervision are essential in women with twin pregnancies. In order to prevent onset of premature labor, bed rest in hospital from the 30th week is suggested. Only 137 (33.5%) of the 408 women were delivered of both infants spontaneously. The need for operative assistance in the remaining 271 (66.5%) patients makes it imperative for all women with twin pregnancies to be confined in hospital. The second twin is specially susceptible to perinatal death on account of labor hazards arising from malpresentation and disturbed uteroplacental circulation after the birth of the first twin. In order to reduce the risk of such death, rupture of the membranes within 10 minutes, followed by prompt and skilled delivery, is advocated.

PEDIATRICS

Seasonal Aseptic Meningitis Caused by Coxsackie and Echo Viruses, Toronto, 1957. M. Clarke, M. Hunter, G. A. McNaughton and others. Canad. M. A. J. **81**:5-8 (July 1) 1959 [Toronto].

The increasing use of tissue culture methods has clarified the etiology of aseptic meningitis to a great extent. It is now evident that except in a poliomyelitis epidemic the virus of poliomyelitis plays a minor role in the etiology of aseptic meningitis. Between June and October, 1957, a total of 65 children were admitted to the Hospital for Sick Children, Toronto, with a diagnosis of aseptic meningitis. Of these cases, 51 were chosen for special study; the clinical diagnosis was confirmed by the finding of characteristic changes in the cerebrospinal fluid. The majority of cases occurred in July and August, and the males outnumbered the females 2:1. Seventeen patients (33%) were less than 4 years old, and the others ranged in age from 5 to 14 years. The illness was acute in the majority of patients, commencing 1 to 3 days before admission. The symptoms were those typical of the aseptic meningitis syndrome. Five patients presented with a rubelliform rash similar to that found in 1956 associated with infection by enteric cytopathogenic human orphan (ECHO), type 9, virus. Splenomegaly was noted in 7 cases. Cells were present in the cerebrospinal fluid in all the patients, the count ranging from 25 to 1,600 cells per cubic millimeter. The mean figure of 400 cells per cubic millimeter was much higher than that usual in poliomyelitis. The cells were mainly lymphocytes. Patients in whom the cell count was more than 500 cells per cubic millimeter were all infected with ECHO viruses. White blood cell counts were normal or slightly elevated. All the children were seen 2 to 8 weeks after discharge. Apart from a few who tired easily, all had completely recovered.

A variety of agents were found responsible for the illnesses. Distinctive were the cases of rubelliform rash in association with the aseptic meningitis syndrome. ECHO, type 9, virus was the agent chiefly associated with cases of rash, although one such case yielded an unidentified ECHO virus. From the total of 51 cases, 36 viruses were isolated by inoculation of human amnion or monkey kidney cells. Viruses were identified as belonging to the following established types: Coxsackie A9, B3, B5, and ECHO, types 6 and 9. Fifteen strains were unidentified but could be allocated provisionally to 3 groups: 9 unidentified ECHO viruses, 4 Coxsackie A viruses, and 2 strains of mumps virus. Serologic evidence combined with the results of tests on blood and cerebrospinal fluid suggested that the stool isolates were active agents in the meningitis syndrome. Thus, of the total 51 cases, 48% were due to ECHO viruses, and 18% to Coxsackie viruses. An additional 14% were established

on serologic grounds as due to mumps. The remaining 20% of the cases, yielding no evidence of infection with enteric viruses or mumps, provide a problem for future studies.

The Behavior of the Red Blood Cell Count and the Value of Hemoglobin During the First Semester of Life in Infants Subjected to Exchange Transfusion. W. Felici and G. Di Piero. Policlinico (sez. prat.) **66**:825-829 (June 15) 1959 (In Italian) [Rome].

The red blood cell count and the hemoglobin values were checked periodically for 6 months in 20 newborn infants, 13 of whom had suffered from incompatibility in the Rh system and 7 from incompatibility in the ABO system. Each infant had received an exchange transfusion of 500 cc. of blood. The increase of red blood cells was slow and very irregular in each case. The average count at the first control after the blood transfusion was 3,740,000 per cubic millimeter (with 3,000,000 and 4,740,000 as extreme values); at the last count, 6 months later, the average count had gone up to 4,000,000 per cubic millimeter (with 3,500,000 and 4,940,000 as extremes). Changes in the hemoglobin values were not significant. A severe anemia was noticed during the second and third months of life in 4 infants; this crisis was coincident with the so-called physiological anemia of the newborn. Treatment with liver extracts and vitamin B_{12} gave good results even in infants with the severest forms of anemia. The authors believe that the first 6 months of life in an infant who has had hemolytic disease and who has been treated with exchange transfusion represent a critical period for restoring the normal blood picture. It is especially important to control for some time the red blood cell count, even if this count returns to normal right after the transfusion, and to check with adequate treatment any eventual irregularities.

Hyperbilirubinemia in Premature Infants: A Follow Up Study. C. A. Koch, D. V. Jones, M. S. Dine and E. A. Wagner. J. Pediat. **55**:23-29 (July) 1959 [St. Louis].

Serial determinations of serum bilirubin values were made during the first week of life in 100 premature infants. None of the patients had any demonstrable evidence of infection or isoimmunization. Those who developed hyperbilirubinemia were considered to have "physiological jaundice," and at that time (1953) no treatment was instituted. Eight infants died, 2 of them having had kernicterus; their bilirubin levels had been greater than 20 mg. per 100 ml. The remaining 6 infants, who died of other causes, had bilirubin levels below 20 mg. per 100 ml. Of the surviving infants, none had neuromuscular abnormalities on discharge from the nursery. Forty-nine infants were followed up at the age of one year or more; 5 of these had neuromuscular abnormalities highly suggestive of kernicterus. All these patients had had serum bilirubin levels of more than 20 mg. per 100 ml. during the neonatal period. The relation of kernicterus to birth weight and condition of the infants at birth was not so distinct as the relation to hyperbilirubinemia. The difficulties encountered in establishing a clinical diagnosis of kernicterus in the first weeks of life make repeated follow-up examinations of the infants over a period of several years necessary. Exchange transfusions are indicated for all infants with hyperbilirubinemia during the neonatal period if it is evident that the serum bilirubin levels will exceed 20 mg. per 100 ml.

Problems Presented by the Jaundiced Newborn. C. M. McCue, A. B. Mayer and R. O. Hudgens. Virginia M. Month. **86**:390-395 (July) 1959 [Richmond].

One hundred sixty-one of the 6,085 infants who were born in, or admitted to, the hospitals of the Medical College of Virginia in Richmond during 1957 developed significant jaundice in the neonatal period. Eighty of the 161 infants were white and 81 were Negroes; 73 were male and 88, female. The birth weight of 158 of the 161 infants ranged from 1,000 Gm. for the smallest infant in the series to 4,250 Gm. for the largest; approximately 30% of the total group were of a weight less than 2,500 Gm., which was considered premature for the purpose of this study. Jaundice was thought to be of physiological origin in 103 infants; icterus was detected within 36 hours after birth in 20 of these infants and during the first 24 hours of life in 6. Thirteen of the 76 jaundiced infants in whom bilirubin was determined presented a maximum bilirubin level in excess of 20 mg. per 100 cc. None of the 103 infants received replacement transfusion. Only one death occurred in this group of infants.

Thirty-nine infants showed jaundice in association with erythroblastosis due to either Rh or ABO incompatibility. The generally accepted methods of treatment with replacement transfusions gave satisfactory results in 17 instances. In this group only 2 babies with a severe form of the disease died. On autopsy one of them was proved to have kernicterus; the total bilirubin level never exceeded 16 mg. per 100 cc., but the infant presented hypoxia.

Jaundice was due to sepsis in 20 instances. Blood cultures were taken in each case, but a positive bacteriological isolation was obtained in only 5 infants. Findings, such as unstable temperature curve, lethargy, anorexia, abdominal distention, and failure to gain weight, when combined with visible jaundice, according to the authors, justify the diagnosis of sepsis despite the lack of bacteriological proof. Thirteen of the 20 infants were of premature weight. Jaundice was detected from 36 hours to

26 days after birth. Seven infants of this group, 6 of premature weight, died despite antibiotic therapy, maintenance of fluid and nutritional requirements, and general and supportive care. Two of these infants were moribund on arrival at the hospital and died within 9 hours of admission.

Congenital Leukemia. M. A. Brescia, E. Santora and V. F. Sarnataro. J. Pediat. **55**:35-41 (July) 1959 [St. Louis].

The authors report on a fatal case of congenital stem-cell leukemia in a 28-day-old boy. The infant was apparently well when born after an uncomplicated labor, the birth weight being 7 lb. 6 oz. (3,345 Gm.), and he gained weight normally until the 28th day of life when he refused his feeding. Thereafter his condition deteriorated rapidly, and he died 2 hours after admission to the hospital, despite oxygen and other supportive treatment. A blood count obtained before death revealed 1.5 million leukocytes per cubic millimeter. Autopsy showed that all the hemopoietic, as well as the nonhemopoietic, organs were markedly infiltrated with leukemic cells. The mother's history revealed that she was subjected to repeated roentgenologic examinations 5 months before the beginning of gestation. A marked increase has been reported in the incidence of leukemia and other types of neoplasms in children during the first 10 years of life when their mothers have received diagnostic examinations during pregnancy. Whether roentgen radiation received before pregnancy is an etiological factor requires further study and observation.

Eosinophils in the Thymus in Hyaline Membrane Disease (Respiratory Distress Syndrome). M. M. Black and A. G. Baldi. Pediatrics **24**:205-214 (Aug.) 1959 [Springfield, Ill.].

Hyaline membrane disease was found to be commonly associated with perivascular aggregates of mature and immature eosinophils in the septums of the thymus in premature infants. Similar eosinophilic aggregates were much less frequent in the thymus glands of stillborns and in cases of perinatal death in which the infants had no hyaline membrane disease. Among 27 infants with hyaline membrane disease, 20 (74%) had both mature and immature eosinophilic aggregates, grading 4 plus or more. This degree of eosinophilia was found in only 2 (6%) among 35 cases of stillbirths and of perinatal deaths in which the infants had no hyaline membrane disease. Hyaline membrane disease was found in 27 (53%) of 51 cases of perinatal death, the infants weighing between 850 and 3,500 Gm. (about 2 and 8 lb.). However, hyaline membrane disease occurred in 20 (87%) of 23 cases of perinatal death in which the infants had thymic eosinophilia; in contrast, among similar cases but without eosinophilia, hyaline membrane disease occurred in only 7 (25%) of 28 infants. These data suggest that the frequency of eosinophilia was significantly greater in infants with hyaline membrane formation than in those without it.

The occurrence of eosinophilia in the thymic septums of infants with hyaline membrane disease could not be explained by either birth weight or duration of postnatal survival. Numerous eosinophils were also found in the axillary lymph nodes in 4 of 8 cases of hyaline membrane disease. Further investigation is needed to elucidate the participation of various vascular homeostatic mechanisms in the pathogenesis of this condition, such as adrenal steroids and proteins in the serum and lymphoreticuloendothelial system. Such an approach might yield information of therapeutic as well as academic value.

Clinical Observation of Familial Phenylpyruvic Oligophrenia. L. Yasse. Acta paediat. belg. **13**:86-102 (no. 2) 1959 (In French) [Brussels].

The author reports the familial occurrence of phenylketonuria (phenylpyruvic oligophrenia) in 2 girls, aged 12 and 10 years, who were sisters, and in a 9-year-old girl, who was a second cousin of the 2 sisters. Three living siblings of the sisters were completely normal. The sisters both had ash-blond hair and showed the classic manifestations of phenylketonuria, namely, a dry, rough, and scaly skin, jerky movements of the extremities, and a low-grade intelligence, their intelligence quotients being 40 and 70 respectively. Both these children excreted phenylpyruvic acid in the urine, and chromatography revealed excessive amounts of phenylaminopropionic acid (phenylalanine). The sisters' cousin had 6 normal siblings; she too had ash-blond hair and a dry, rough, and scaly skin; her face was inexpressive; her lower extremities were cyanosed and cold and habitually held in flexion. Her mental defect was similar to that of the older of the 2 sisters, but repeated examination of the urine did not reveal the presence of phenylpyruvic acid. The clinical aspect of this third patient thus was typical of phenylketonuria, but the biochemical aspect was not. Early placement of such patients with phenylketonuria on a phenylalanine-deficient diet is emphasized.

UROLOGY

Unilateral Renal Artery Disease with Hypertension. J. J. Cordonnier. J. Urol. **82**:1-9 (July) 1959 [Baltimore].

Recent advances in vascular surgery have produced increased interest in unilateral renal artery disease as an etiological factor in hypertension. During the past 2 years the author had occasion to follow 7 patients in whom the diagnosis of hypertension secondary to unilateral renal artery disease seemed authenticated, and in whom nephrec-

tomy produced a satisfactory clinical response. One of the cases presented falls into the category of congenital narrowing of the renal artery; 2 presented classical partial renal infarction; 1 was secondary to trauma; and the other 3 were secondary to atherosclerosis. In order to produce hypertension, renal ischemia with relatively normal parenchyma is necessary. Intravenous pyelography is of definite value as a screening procedure in all cases of hypertension, and the presence of decrease in size and/or function on one side may be significant. However, this finding alone is not sufficient basis for nephrectomy.

Two cases demonstrated clearly the danger of depending on intravenous pyelography alone. In both cases the dye concentration, adequate on both sides, was, if anything, somewhat better on the affected side. In cases of this type, aortography is an absolute necessity prior to surgery. Furthermore, normal intravenous pyelograms do not rule out the possibility of unilateral vascular disease. The use of differential sodium studies and volume of urine excretion is of value as a screening procedure but must be substantiated by aortography. In patients with a fairly typical history of renal infarction, or in whom there is no excretion of dye on the affected side with normal retrograde filling of calyces and pelvis, aortography is not necessary to establish the diagnosis of unilateral arterial disease, and since aortography is not without a certain degree of hazard, the author does not use it under these circumstances.

The author feels that unilateral renal vascular disease has not received sufficient attention from urologists in the past. The results in the cases presented have certainly been gratifying and should stimulate a more careful evaluation of all hypertensive patients. On the other hand, careful and thorough evaluation must be performed in each individual case, if unnecessary and unwise nephrectomy is to be avoided in some instances.

Hypernephroma Associated with Polycythemia. J. H. De Weerd and A. B. Hagedorn. J. Urol. **82**:29-36 (July) 1959 [Baltimore].

Anemia ranks high on the list of common clinical findings associated with hypernephroma. Hence it would appear somewhat incongruous to associate in a cause-effect manner the antithesis of anemia, polycythemia, with the same lesion. Personal experience with 3 such cases prompted further search, and records of 7 well-documented cases were found in the Mayo Clinic files for the past 10 years. The authors have found it difficult to identify the polycythemia in these patients as either polycythemia vera or secondary polycythemia. None of the patients had leukocytosis, thrombocytosis, or splenomegaly on initial examination. The clinical response to nephrectomy appears to offer formidable supportive evidence to the diagnosis of secondary polycythemia in 5 of the 6 patients who survived operation. These 5 patients experienced remission of their polycythemia for periods ranging from 9 months to 5½ years. Two of the 5 experienced apparent exacerbation when metastasis became clinically evident, and the 6th patient, whose polycythemia was less favorably affected, had pulmonary metastasis at the time of nephrectomy.

The etiology of this form of secondary polycythemia remains a matter of conjecture. The size of several of the tumors in these patients is noteworthy, as is the fact that in 4 of the 7 patients special mention was made of huge dilatation of the veins, over and above the normally anticipated vascularity of renal adenocarcinomas. These facts seem to give credence to theories that rapid shunting of arterial blood to these dilated veins leads to increased erythropoietic activity. Jacobson and co-workers in 1957 postulated the role of the kidney in active erythropoiesis as that of either producer or activator of erythropoietin. Renal tumors, then, may produce an excess of these factors. One can postulate exacerbation of increased erythropoiesis coincident with development of metastatic lesions after nephrectomy.

Novobiocin-Sulfamethizole Combination in the Treatment of Genitourinary Infections. J. M. Costa and M. Stella. Hospital, Rio de Janeiro **55**:79-83 (June) 1959 (In Portuguese) [Rio de Janeiro].

The problem of primary or secondary genitourinary infection, one of the most complex in urology, has been further complicated by the development of bacterial forms resistant to antibiotic therapy. Among the new preparations aimed at solving this problem is the combination of novobiocin and sulfamethizole, which the authors used in treating 82 patients, whose ages ranged from 5 to 86 years. In 62 patients the genitourinary infection was primary; in 20 it was secondary, following a surgical intervention. In the nonsurgical patients the treatment was initiated as soon as the diagnosis was established; in those who had undergone surgery it was started on the 4th postoperative day. In all the cases, except one in which the patient was a child, the dose was 2 tablets a day, taken at a 6-hour interval. The child was given half a tablet twice a day, with a 6-hour interval.

In 75 (91.4%) of the 82 cases, the therapy with the novobiocin-sulfamethizole combination resulted in complete recovery, which was clinically and bacteriologically asserted within 10 to 12 days; in a few cases the treatment lasted for 28 days. The most outstanding results were obtained in a group of patients who had undergone prostatectomy. In these cases the urine became clear within 8 to 10 days, as compared with the 4 to 8 weeks usually required in such circumstances. Only 6 patients failed to respond to the treatment, and a

7th had a recurrence after a 2-week period of negative cultures. Only 4 patients suffered side-effects—2 with gastrointestinal disorders and 2 with urticaria. It is the authors' opinion that the results obtained with the novobiocin-sulfamethizole combination represent the best results they have had in the treatment of primary or secondary genito-urinary infection.

Unilateral Thrombosis of Renal Veins: Cases with Violent Hematuria Treated with Nephrectomy. J. Nielsen, W. Permin and K. Schourup. Nord. med. 61:849-852 (June 4) 1959 (In Danish) [Stockholm].

Renal vein thrombosis, according to the literature, occurs equally frequently in both sexes and is equally often bilateral and unilateral. There may be massive or microscopic hematuria and not infrequently transitory hematuria. The etiology is unknown. The prognosis, which according to the literature is unfavorable, can probably be improved by anticoagulation treatment introduced early. In case of unilateral disease, nephrectomy can be considered, to hinder the development of atrophic kidney. Two cases seen at a year's interval in Bispebjerg Hospital were alike in symptoms and course. They occurred in apparently healthy women, aged 23 and 39 years, respectively, the younger patient being 5 months pregnant. There were no other thromboembolic symptoms. The disorder was unilateral, and the main symptoms were pain and hematuria so marked that, in spite of 10 transfusions, nephrectomy was done on vital indication. Histologically, thromboses were found in many of the interlobular and arciform veins; there were myriads of erythrocytes in the convoluted tubuli. The patients have since been well.

THERAPEUTICS

Response to Stretch of Hypertonic Muscle Groups in Hemiplegia. J. B. Brennan. Brit. M. J. 1:1504-1507 (June 13) 1959 [London].

A chance observation provided the stimulus for the work presented. A man with hemiplegia of one year's duration was fitted with a splint to prevent contracture of his knee, which was held in 90 degrees flexion by tonic spasm; the splint held his knee in full extension. Next seen a month later, the patient explained that he had worn the splint constantly. He had found it comfortable to wear, and it had enabled him to walk, so he had not risked its removal, fearing his spasm might return. On examination it was found that hypertonus in the hamstrings had been abolished and that voluntary extension, previously absent, could be performed against resistance. Tonus in the quadriceps, originally mild, had become appreciable, but voluntary flexion had not been much affected. The patient had had no other treatment during that month, and it seemed probable that this new distribution of tonus in the flexors and extensors of the knee was a result of stretching the former and shortening the latter constantly for a time. It was a most desirable change, since it enabled the man to walk.

Fourteen hemiplegic patients were selected, and the response to stretch of 19 flexor muscle groups —18 in the upper limbs and 1 in the lower—was studied. The average duration of hemiplegia before beginning treatment was 18 months. The results obtained support the thesis that the tonic muscle spasm shown by certain flexor muscle groups in patients with residual hemiplegia can be abolished by submitting the muscles to a long period of stretch. This was effected by keeping the appropriate joints, originally held flexed by spasm, extended in splints. Each was constantly stretched for an average period of 3 months and for diminishing daily periods during the succeeding 2 months. Control was exercised by observing any spontaneous change in the neighboring unstretched groups in each patient. Hypertonus was abolished in all the treated flexor groups. Voluntary flexion was not impaired except in one case. The antagonist muscles achieved an increased power and range of movement in most cases. No lasting spontaneous change occurred in any of the control muscle groups.

Ten patients in the series studied still survive. Of these, 6 have retained the above features in all 9 stretched muscle groups and their antagonists during an average period of 58 weeks since stretch was stopped. Six muscle groups in 4 patients have reverted to their original state in a similar time. The factors which may be responsible for this variable response are suggested.

Arteritis Caused by Hypersensitivity to Methylthiouracil. F. Hogewind, H. N. Hadders and L. Meyler. Nederl. tijdschr. geneesk. 103:1009-1012 (May 9) 1959 (In Dutch) [Amsterdam].

After citing several literature reports on the development of arteritis during or after the use of thiouracil derivatives, the authors present the case of a 33-year-old man with toxic diffuse goiter (Basedow's disease), who during 3 weeks in the hospital was given daily 200 mg. of methylthiouracil. This had the effect that the basal metabolic rate decreased from +54 to +14. After the patient's discharge treatment was continued, at first with daily doses of 100 mg. and later of 50 mg. of methylthiouracil. With this maintenance therapy the patient remained in fairly good condition, except that occasionally blood tests revealed eosinophilia.

After the methylthiouracil therapy had been continued for 2¼ years, the patient was hospitalized again, complaining of sore throat, pains in knees and elbows, chest pain on the left side, and occasional vomiting. Because of joint pains he had recently also taken a salicylate. He appeared ill, with fever and symptoms of pericarditis with effusion. He had pleurisy on the left side, and later also on the right. Several joints were painful and swollen. There was proteinuria and increased blood pressure. These symptoms gradually disappeared when the patient was given corticotropin (ACTH), with continuation of the methylthiouracil therapy. Reduction in the ACTH dosage, however, was followed by a relapse, after which the methylthiouracil medication was discontinued. After 5 weeks' treatment with prednisone and ACTH, the man was discharged. The authors believe that the inflammation of the small arteries which developed in this patient was a result of the treatment with methylthiouracil. Signs of polyserositis often accompany this condition.

Side-Effects of Tetracycline Alone and of Tetracycline with Nystatin. R. Larkin. Lancet 1:1228-1229 (June 13) 1959 [London].

Tetracycline probably remains the most dependable drug for the treatment of the acute "flare-up" of chronic, nonspecific respiratory infections; but distressing side-effects are fairly common. Childs, in 1956, found that nystatin inhibited the increased growth of Candida albicans observed in the feces of patients treated with tetracycline, but there is disagreement about the ability of nystatin to modify the incidence of gastrointestinal and other side-effects caused by tetracycline. In the study presented, a total of 98 adult patients, mainly with acute or chronic respiratory infections, were placed at random in 2 groups. Those in one group (55 patients) were treated with 250 mg. of tetracycline hydrochloride 4 times daily, and those in the other group (43 patients) with 250 mg. of tetracycline hydrochloride and 250,000 units of nystatin 4 times daily. Clinical side-effects were recorded in terms of gastrointestinal discomfort, diarrhea, and anogenital pruritus. In the latter part of the trial rectal and throat swabs were taken on the 5th day of treatment and examined for the presence of C. albicans and other yeasts.

Gastrointestinal disturbances were noted in 37 of the 55 patients on tetracycline alone, and in 4 of the 43 on tetracycline plus nystatin. Diarrhea developed in 9 of the former group but in none of the latter group. On the 5th day of treatment rectal swabs positive for yeasts were obtained from 11 out of 19 tetracycline-treated patients and from 2 out of 18 given the tetracycline–nystatin combination. Oral thrush developed in 3 of the 19 patients given tetracycline alone but in none of the 18 who received nystatin in addition. Since nystatin is antifungal and has little effect on bacteria, viruses, and various animal cells, it seems reasonable to assume that suppression of fungi is responsible for the reduction in side-effects. This assumption is supported by the frequent isolation of C. albicans and other yeasts from rectal and throat swabs taken from patients who complained of gastrointestinal disturbances. The simultaneous administration of nystatin with tetracycline inhibits the overgrowth of fungi in the intestines and has a similar, although less pronounced, effect on yeasts in the throat. In addition to affording protection against the direct invasion of tissue by C. albicans leading to clinical moniliasis, nystatin apparently can reduce gastrointestinal disturbances substantially during the oral use of tetracycline hydrochloride, which disturbances may be fungal hypersensitivity reactions.

Oral Tartar Emetic Treatment of Schistosomiasis Japonica. Y. C. Mao, S. C. Sheng, C. K. Tu and others. Chinese M. J. 78:532-541 (June) 1959 (In English) [Peking].

The clinical results obtained with the oral administration of a tartar emetic compound to 556 patients with schistosomiasis are reported. These patients, selected from more than 3,000 treated by the authors, were at different stages of chronic schistosomiasis; all had positive findings of cercariae in the stools. There were 512 males and 44 females in the series; the ages ranged from 5 to 66 years, with the great majority in the young adult category. Most of the patients (485) were treated at 2 hospitals and a clinic in Chinua; 20 were treated at home or at their place of work; and 51 were treated at the Chinua Agricultural School without interruption of attendance.

The tartar emetic compound used for treatment contained equal parts of tartar emetic and sodium bitartrate in enteric-coated capsules or tablets of 10 and 50 mg. For adults the initial dose was 30 mg. taken in 3 tablets or capsules a day. The dose was increased to 60 mg. on the second day, to 150 mg. on the third, and to 300-450 mg. from the fourth day on, until the patient had received a total dosage of 100 to 120 mg. per kilogram of body weight. The shortest duration of the treatment was 10 days, in children; the longest was 22 days; in most cases it was 17 days. The therapeutic effects were evaluated by the results of stool examination and the improvement in the clinical condition. Of 357 patients for whom stool examination was performed, 285 had negative findings at the end of the treatment. The clinical improvement consisted mainly in reduction in size of the liver and spleen, decrease or disappearance of ascites, disappearance of dysentery symptoms, and increase in working capacity and appetite, with a general feeling of well-being.

The immediate over-all effect of the tartar emetic treatment was evaluated in 90%, and the remote effect in 60%, of the patients. The untoward reactions observed were mainly gastrointestinal disorders, which disappeared rapidly with interruption of the therapy or a reduction in the dosage. In 98% of the cases the patients tolerated the reactions and were able to complete the treatment. The number and severity of the reactions decreased when a satisfactory coating was obtained for both the capsules and the tablets. The authors point out the advantageous features of the oral administration of a tartar emetic compound; it is a comparatively safe, simple, and inexpensive method of treating schistosomiasis, which can be carried out at the patient's home or place of work.

Research on the Diuretic and Salt Diuresis Promoting Activity of Hydrochlorothiazide: Preliminary Clinical Study. G. Casirola and D. Meduri. Minerva med. **50**:1608-1613 (May 26) 1959 (In Italian) [Turin, Italy].

The authors report on the effect of hydrochlorothiazide on 45 patients, 30 to 82 years of age, who suffered from disturbances of water and salt metabolism. Eleven patients presented hepatic cirrhosis, with ascites; 25, cardiac insufficiency, with edema; 4, edematous nephrosis; and 5, neoplasms, with edema or ascites. Hydrochlorothiazide was given to each patient in the morning and again after 12 hours. Three patients with cirrhosis received 50 mg. of the drug per day for 19 days, 4 received 75 mg. per day, 3 received 100 mg. per day, and 1 received more than 150 mg. per day. An increase in the daily volume of urine, in some cases of more than 3,000 cc. per day, was observed in 9 of these patients. The drug had no effect on 2 patients, but these patients also had derived no benefit from chlorothiazide. With the exception of 2 patients who had taken a daily dose of 100 mg. and who suffered from diarrhea on the third and fourth days of treatment, the drug was well tolerated. Best results were obtained in patients who received a daily dose of from 50 to 75 mg. per day. Ascites was checked within 40 days in 4 patients.

A 75-mg.-per-day dose was the optimal daily dose for promoting salt diuresis; it gave results far superior to those obtained with a dose of 1,500 mg. of chlorothiazide per day. Good results were obtained also in the cardiac patients; 5 of these patients, however, did not respond to treatment with either hydrochlorothiazide or chlorothiazide. The optimal doses among the other 2 groups ranged from 25 to 75 mg. per day. Satisfactory results were obtained in the symptomatic treatment of edema in patients with neoplasms. The results in patients with nephrosis were proportional to the extent of involvement of the parenchyma of the kidney.

The authors point out that hydrochlorothiazide is absorbed rapidly from the intestine, is nontoxic, causes no side-effects, favors the elective elimination of the sodium ion and the chloride ion, and has no effect on the elimination of potassium. It has its best effect with a dose 30 times smaller than the dose needed with other diuretics. It can be given to patients who are being treated with substances that increase the elimination of potassium, and has a hypotensive effect in patients with hypertension.

RADIOLOGY

Suprasternal Thoracic Aortography: Suprasternal Transthoracic Needle Puncture Opacification of the Thoracic Aorta. J. S. Lehman, W. M. Lemmon, R. A. Boyer and E. A. Fitch. Radiology **73**:18-36 (July) 1959 [Syracuse, N. Y.].

The authors report on 92 patients, between the ages of 14 and 60 years, and a 3-year-old child, in whom 110 attempts at opacification of the thoracic aorta were made by a transthoracic needle puncture in which a suprasternal approach was used. A 17-gauge, thin-wall needle of 7-in. length was employed. The needle was connected by a 14-in. length of special high-burst strength, but reasonably flexible, plastic tubing to a special large-bore 3-way stopcock. From the stopcock the system was connected by a 40-in. length of plastic tubing to a pressure injection apparatus and also to a capacitance-type electromanometer and direct writing polyoscillograph. Pressure tracing and electrocardiographic monitoring were recorded simultaneously. Diatrizoate sodium in either 85 or 90% concentrations was used as contrast medium. The radiopaque medium was injected in 84 of the 110 attempted examinations, 68 of which were performed for demonstration of the presence and/or degree of aortic valvular insufficiency, 38 for the primary purpose of determining the status of the coronary arterial system, and the remaining 4 for evaluation of suspected patent ductus arteriosus. Of the 84 examinations in which injection was made, aortic opacification resulted in 78; of the latter, satisfactory needle penetration was accomplished with one needle pass in 46, 2 needle passes in 14, 3 passes in 9, 4 passes in 8, and 5 passes in 1. Important complications, including moderate to severe shock, occurred in 7 patients.

The ultimate place and value of this procedure of suprasternal thoracic aortography are yet to be determined. The procedure is to be considered another method of direct delivery of a radiopaque medium to the ascending aorta and, as such, can effect excellent opacification of the thoracic aorta and its branches. The direct demonstration of regurgitant reflux from the aorta into the left ventricle can be achieved, and such demonstration under the conditions of the procedure, as employed

by the authors, is, as they interpret it, evidence of dynamic aortic valvular insufficiency. Some estimation or quantitation of aortic insufficiency is also possible by the procedure. By its application to coronary artery opacification, rather satisfactory demonstration of the coronary system can, on occasion, be obtained. The procedure is not without real hazard. The potential dangers of needle trauma—tear of the aortic wall or other mediastinal vascular structures, intramediastinal or intrapericardial hemorrhage, laceration of a coronary artery or aortic valve cusp, aortic intramural or paraaortic injection of radiopaque medium, and pneumothorax—must be considered. Considering the small size of the aorta in infants and children, it appears at present that the procedure presents too much risk, and its accomplishment is too difficult, to adapt it to such patients.

Emphasis should be placed on the following factors to obviate possible complications: (1) careful study of preliminary chest roentgenograms to determine as accurately as possible the direction of needle insertion and the maximal permissible distance of the needle advancement; (2) scrupulous attention to the pressure wave recordings, and withholding of the radiopaque injection if there is any suggestion of pressure wave "damping"; (3) avoidance of any voluntary or involuntary movement of the patient, especially the head and neck, during or after intramediastinal insertion of the needle; (4) strict attention to the prevention of any further movement of the needle other than that transmitted by the aortic pulsations, once the needle has been satisfactorily positioned; (5) conservatism regarding repeated needle passes; no more than 4 needle passes should be permitted to obtain satisfactory intra-aortic positioning of the needle; and (6) discontinuance of the procedure at the earliest sign of any aberration in patient reaction, persistent electrocardiographic changes, or technical difficulties.

Percutaneous Implantation of Radiogold into the Hypophysis in Patients with Metastasizing Mammary or Prostatic Carcinoma. E. Frey and U. Cocchi. Schweiz. med. Wchnschr. **89**:652-656 (June 20) 1959 (In German) [Basel, Switzerland].

The severe pains caused by skeletal metastases in patients with mammary or prostatic cancer present a difficult therapeutic problem, because patients may become addicted to analgesics. Since there have been reports that these pains respond to hypophysial implantation with radioisotopes, the authors used Bauer's radiogold (Au^{198}) method. Puncture of the sella turcica is done by the percutaneous, paranasal, transethmoidal, transsphenoidal route. The technique is comparatively simple and is tolerated even by patients in a very reduced condition. The hollow needle employed has a pointed mandrin for advancing it, and 3 blunt mandrins of different lengths for the introduction of the radiogold seeds, each of which contains 10 mc. of Au^{198}. Except for one woman, with an especially small sella turcica, in whom 3 seeds (30 mc.) were implanted, 4 radiogold seeds were implanted in the 8 patients of the series. These included 7 women with metastatic mammary carcinoma and 1 man with metastatic carcinoma of the prostate. No deaths resulted from the treatment, and all the patients experienced pain reduction, 2 being practically freed from pain. Whereas the progression of the osseous metastases was arrested, the metastases in the liver and lung seemed not to be influenced. Clinical and histological observations indicated that it is impossible to destroy the entire hypophysis by central implantation of 4 radiogold seeds.

Value of Radiologic Signs in the Malabsorption Syndrome: Changes Following Treatment. I. Larrechea, M. M. Mejilla, A. Schapira and V. d'Alotto. Prensa méd. argent. **46**:178-185 (Jan. 16) 1959 (In Spanish) [Buenos Aires].

One of the most important problems in the radiologic diagnosis of sprue is the interpretation of the variety of signs which are mere manifestations of functional disorders. The authors studied the diagnostic and the prognostic value of radiologic findings in 11 cases of primary malabsorption syndrome and compared the radiograms taken before and after treatment and during periods of remission. There were 5 males and 6 females in the series, with ages ranging from 10 to 53 years. All the patients had been given a diagnosis of malabsorption syndrome, established by clinical and laboratory findings. Each patient had had radiograms of the small intestines taken in ventral decubitus every hour during a 5-hour period. The pictures showed dilatation of the intestinal folds in 6 patients, segmentation in 9, hypersecretion in 11, thickening of the plicae in 10, moulage in 6, and alterations in motility in 6. Comparing the clinical and radiologic pictures of each patient, it was found that the characteristic most closely related to seriousness of the disease was dilatation. It was also found that in the 6 cases in which dilatation of the intestinal folds was present it was associated with other intestinal abnormalities.

In 9 patients treated with prednisone, folic acid, and vitamins, it was possible to take post-therapy radiograms and observe if there had been any changes in the intestinal picture. Only one patient, who had been discharged after complete clinical recovery, had a normal radiogram. The authors conclude: 1. The presence of radiologic signs of dilatation of the intestinal folds indicates a severe form of the malabsorption syndrome. 2. The association of this dilatation with other radiologic signs of intestinal abnormality constitutes a criterion for diagnosis of the disease.

BOOK REVIEWS

Antibiotics: Their Chemistry and Non-Medical Uses. Edited by Herbert S. Goldberg, Ph.D. Contributors: Herbert S. Goldberg and others. Cloth. $15. Pp. 608, with illustrations. D. Van Nostrand Company, Inc., 120 Alexander St., Princeton, N. J.; 257 Fourth Ave., New York 10; D. Van Nostrand Company, Ltd., 358 Kensington High St., London, W. 14, England; 25 Hollinger Rd., Toronto 16, Canada, 1959.

The title of this book might be misleading to those not having had an opportunity to review it. Actually, anyone interested in antibiotics, whether their field is medical or nonmedical, should find it an excellent reference source. The first two chapters cover basic material on antibiotics, including antibacterial effects, mode of action, and chemistry. The next four chapters cover the use of these drugs in nutrition, in plant disease control, food preservation, and their use in the isolation of pure cultures. The final chapter discusses in detail the public health significance of the nonmedical uses of antibiotics. The organization of the book is good, and the clinician readily will note from the last chapter that the nonmedical uses of antibiotics really become medical problems, since such uses may result in antibiotic residues in foods, including meats, milk, fruits, and vegetables, that are consumed by man. Ingestion of antibiotic residues may cause allergic reactions, superinfection, or the development of resistant micro-organisms. The book contains several thousand references, most of them abstracted in the text. It is well written, makes good reading, and should be of great value as a reference volume for the interested clinician.

The Truth About Your Eyes. By Derrick Vail, M.D. Second edition. Cloth. $3.50. Pp. 180, with 6 illustrations. Farrar, Straus & Cudahy, Inc., 101 Fifth Ave. New York 3, 1959.

Written for the layman, this revised edition presents in simple, concise language the most interesting and important information about eyes desired by patients. Among the abnormalities discussed are cataract, glaucoma, muscular anomalies, refractive errors, injuries, and infections. The fundamentals of ocular development, anatomy, physiology, and hygiene are briefly presented. The objective discussion of current controversial subjects such as contact lenses, cycloplegics, ocular exercises, eye glasses, eye strain, and vitamins is especially good. This book can be read with profit by ophthalmologists and other physicians because it facilitates clear, authoritative answers to many patients' inquiries and is an aid in preparing educational talks to laymen. Intelligent laymen who have read this book agree that it is interesting and informative. One suggested that several of the more technical discussions, including that on cranial nerves, should be condensed.

In the next edition, greater emphasis should be placed on the aggravating effect of emotional excesses and nervous tension on numerous functional and structural eye diseases including many glaucomas, allergic manifestations, and vascular retinopathies. The popular misconception that all of every patient's ocular symptoms are due to a single and all-inclusive cause and that its removal will promptly result in complete recovery should, if possible, also be corrected. Following the present trend that mass education is an important step in the prevention and treatment of disease, the author's broad experience has made possible this practical contribution which is of interest especially to eye patients and ophthalmologists.

Recreation in Total Rehabilitation. By Josephine L. Rathbone, Ph.D., Associate Professor, Department of Health Education, Physical Education and Recreation, Teachers College, Columbia University, New York, and Carol Lucas, Ed.D. Cloth. $9.50. Pp. 398. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill.; Blackwell Scientific Publications, Ltd., 24-25 Broad St., Oxford, England; Ryerson Press, 299 Queen St., W., Toronto 2B, Canada, 1959.

The authors of this volume feel that whether recreation is considered a type of therapy or wholesome activity is beside the point as long as it contributes to the welfare and recovery of the patient. The general mission of the book is to explore the recreational experiences that can be helpful to a patient and the kind of skills needed by the recreation leader who provides them. Rehabilitation today is a team affair in which the team may range from only a physician and a member of the patient's family, to a physician, nurse, therapists, and others. Whatever the size and kind of the team, the physician is captain or quarterback. He calls the plays and directs the team—"evaluates the patient, prescribes activities, and coordinates and integrates the various parts of the program, as it applies to each patient."

The physician evaluates and prescribes for the patient on three bases—physiological, kinesiological, and psychological—and each member of the rehabilitation team, including the recreation leader, must understand the patient's assets and liabilities in these areas. Otherwise he may do physiological, kinesiological, or psychological harm to the patient in carrying out the prescription. This requires that

These book reviews have been prepared by competent authorities but do not represent the opinions of any medical or other organization unless specifically so stated.

the leader have appropriate medical orientation as well as proper recreational preparation for his role. The exact nature of the necessary medical orientation has not been defined, but there is general agreement that it should be at the graduate level and in a school affiliated with a medical college or at least a teaching hospital.

The book goes on to outline problems found in institutions serving the ill and handicapped and to describe some of the medical indications for recreational activities and how such experiences may help the patient. The rest of the volume is devoted to recreational activities and their adaptation and programing for the ill and handicapped. This goes far beyond games and sports to include music, the graphic and plastic arts, crafts, hobbies with special emphasis on collections and nature lore, literature and the theatre, writing and acting, dancing, and special events. This volume should have its greatest value as a guide for recreation leaders preparing themselves in rehabilitation and undergoing orientation in the medical setting. Such persons should find much of the text familiar in terms of recreation principles and practices but also much that is new and helpful in their suggested application for the ill and handicapped. To some extent the opposite is true; those on the rehabilitation team whose orientation is therapeutic may here find a new interpretation of recreation.

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Diabetic Manual for the Patient. By Elliott P. Joslin, M.D., Sc.D. Tenth edition. Cloth. $3.75. Pp. 304, with 41 illustrations. Lea & Febiger, Washington Sq., Philadelphia 6, 1959.

Now in its 10th edition, this is the oldest and best known of the many popular manuals for the guidance of diabetic patients and their families. The first edition appeared in 1918, so this manual has been frequently and continuously revised for more than 40 years. Its author has observed and treated diabetic patients for more than 60 years. As with all other forms of teaching by this well-known group of physicians, the underlying theme of the manual is firm insistence on prevention of abnormal hyperglycemia and glycosuria by means of quantitative diet, insulin (or in certain cases orally given hypoglycemic compounds), and exercise. The author favors insulin over orally given agents and restricts the use of the latter to tolbutamide, but approves of the use of several other orally given compounds by members of the staff. The prevention and management of common complications are stressed, and various psychological, habitual, and even economic attitudes are recommended.

The style of the book is simple and direct. Its author's gentle, inspiring, interested, and interesting personality are mirrored in every page and illustration. Answers to almost every question any diabetic could ask are given in detail, even to the extent of some repetition. Because of the experience, wisdom, and missionary spirit reflected by this manual it can be recommended for all diabetic patients and families, old and new, above all others in the field.

Conquering Your Allergy. By Boen Swinny, M.D. Cloth. $3.95. Pp. 221. Fleet Publishing Corp., 70 E. 45th St., New York 17, 1959.

While this book for the layman has some factual material of value to the allergic person, this basic information is lost in a maze of unorthodox beliefs, inaccuracies, unnecessarily lengthy anecdotes, and recurring boasts. Among the misconceptions are the inclusion among allergic manifestations of Horton's syndrome, Ménière's disease, and "emotional reaction to rainy days, rock n' roll music, or a visit from your mother-in-law," while making no mention of the allergic aspects of blood diseases (thrombocytopenia and acquired hemolytic anemia) or other possibilities of autosensitization. One must disagree with the author's belief that allergic shock from an injection of almost any medication can be forecast by a prior skin test, that no one but a dermatologist or roentgenologist should use x-rays, that the case fatality rate from anaphylactic shock caused by penicillin is as high as he implies (from his statement one can compute that there would be about 500,000 such deaths in the United States), that lay people should be furnished with a complete list of drugs and details of their use, that an author should discuss fees, or that the size and efficiency of his professional staff should be extolled. Since there are several more informative and more accurate books on allergy available to the public, there appears to be no need for this particular book.

Synopsis of Ophthalmology. By William H. Havener, B.A., M.D., M.S. (Ophth.), Professor and Chairman, Department of Ophthalmology, Ohio State University, Columbus. Cloth. $6.75. Pp. 288, with 189 illustrations. C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3; Henry Kimpton, 134 Great Portland St., London, W. 1, England, 1959.

As more knowledge is gained in the various medical and surgical specialties, it becomes more difficult for anyone not engaged in any particular specialty to keep abreast of the advances in the latter. Any effort to spread knowledge in terms which will be useful, particularly to the general practitioner, is worthwhile. Such is the attempt made by the author of this volume. Much valuable information is contained in this small book, and many but not all of the illustrations are good and informative. The author has expanded the book to something more than a synopsis, however, by going into great detail on some subjects. Thus it is something more than a condensed statement and something less than a textbook. This diminishes its value as a ready reference to a nonophthalmologist who might be trying to track down the meaning of a particular sign or symptom.

QUESTIONS AND ANSWERS

SEQUELAE OF HYPERTENSION

To the Editor:—*Is there general agreement that a person with benign arterial hypertension is more likely to suffer a heart attack or stroke than a person with normal blood pressure? Is there a reliable statistical study which shows that the risk of heart attacks and strokes in hypertensive persons is reduced by treatment of hypertension with drugs or by any other method? What is accomplished in the treatment of benign arterial hypertension other than a reduction in the arterial pressure as measured by the sphygmomanometer? I have never been able to correlate very well the alleged symptoms of hypertension—headache, dizziness, weakness, and palpitation—with the height of the blood pressure.*

J. H. Rogers, M.D., Gadsden, Ala.

Answer.—There does not appear to be any proof that the risk of heart attacks and strokes in hypertensive persons is reduced by the treatment of hypertension. Such evidence would be entirely negative in character because we are dealing with a group in which a high incidence of vascular accidents is well documented. It is well established that the incidence of sclerosis of the small and medium sized vessels is increased over a normotensive group, and it seems logical to assume that we might be preventing such damage by reducing blood pressures. This is what one would expect from the treatment of benign hypertension.

Little can be expected from the treatment of the extremely mild or intermittent hypertensive disease. Persons who consistently have a diastolic pressure of 100 mg. Hg or above are in danger of having premature vascular accidents. It is very difficult to correlate the symptoms of hypertension with headache, dizziness, weakness, and palpitation. The most prominent symptom seems to be extreme fatigue.

CASTOR OIL AND SKIN CANCER

To the Editor:—*Has any research been done concerning the effect of castor oil or its main component, ricinoleic acid, on squamous cell cancer?*

M.D., Georgia.

Answer.—There apparently has been no investigation of the effects of castor oil or similar drugs on carcinoma of the skin. The irritative property of castor oil, when locally applied to the skin, is a known characteristic of this drug. It is necessary to point out the possible fallacy in the assumption that, because the cancer disappeared after a topical application, this effect can be attributed to the drug. The oncology of cutaneous cancer would further indicate that this could be an erroneous assumption. There is a so-called morphea type of basal carcinoma, a sclerosing form of cancer, which seemingly resolves centrally, only to advance actively peripherally, thus giving the appearance of being healed. There have also been a number of reported instances in which the spontaneous involution of epithelial carcinoma occurred within a short interval of time.

BENZENE HYDROCHLORIDE AND APLASTIC ANEMIA

To the Editor:—*A 16-year-old boy, previously in good health, has been found during the past three months to have aplastic anemia. Careful questioning about contact with possible bone marrow depressants reveals that his mother occasionally sprays chlordane about the house and that about two years ago 700 to 800 gal. of a solution containing benzene hexachloride was put into the soil beneath the concrete blocks on which the house is built. A definite odor of insecticide still emanates from the bathroom floor about the pipes. The concrete slab does not cover these pipes in accordance with FHA requirements. Could the benzene hexachloride in the soil be responsible for this boy's aplastic anemia? How can one determine if it is safe for others to occupy this house? Please suggest a way to eliminate possible dangers.*

Henry M. Gewin, M.D., Mobile, Ala.

Answer.—A dogmatic answer to the question cannot be made at present. Exposure to benzene hexachloride used in vaporizers has been reported to cause angioneurotic edema, skin sensitivity, urticaria, irritation to the eyes and upper respiratory tract, and anemia (report to the Council on Pharmacy and Chemistry, *J. A. M. A.* **152**:1232-1234 [July 25] 1953). In many instances, a direct causal relationship has not been established. In that report, cognizance was taken of the claim that benzene hexachloride may cause depression of the bone marrow, but the evidence was not regarded as conclusive. More recently, a critical review of the causes of acquired aplastic anemia cited three patients who developed the disease after exposure; there

The answers here published have been prepared by competent authorities. They do not, however, represent the opinions of any medical or other organization unless specifically so stated in the reply. Anonymous communications cannot be answered. Every letter must contain the writer's name and address, but these will be omitted on request.

was additional contact with chlordane, benzene, and/or chlorophenothane (DDT) in each instance (Scott and others, *Medicine* 38:119, 1959).

About all one can say with certainty, therefore, is that benzene hexachloride (and chlordane) may possibly be responsible for a rare case of aplastic anemia. Even if this be true, there probably is marked variability in the susceptibility of different persons to the toxic effect. Since no method of detecting susceptibility currently exists, the safest procedure would be to seal the openings around the pipes. The engineering problems involved in such a seal are unknown to this consultant. Under the existing conditions, the concentration of benzene hexachloride must be much smaller than when the material is distributed from a vaporizer. To what extent the repetition of exposure would compare to the lesser concentration is, of course, another unknown.

SEROLOGIC EVALUATION

To the Editor:—*A patient recently had a Wassermann test with results reported as weakly positive. He had had primary syphilis 30 years earlier and was treated with arsphenamine (and probably mercurials), after which he was informed his blood test result was negative. He later married and had one child, a daughter who has had no signs of the disease. His physical examination indicates no evidence of complications. Does he require treatment now or in the future? What form of treatment would be indicated?*

Edwin P. Bickler, M.D., Milwaukee.

Answer.—Serologic tests performed 30 years ago were not as sensitive as they are today. A weakly positive serologic reaction which is unaccompanied by signs or symptoms of syphilis is not uncommon, and therefore no treatment is indicated. Serologic tests and physical examination should be made at proper intervals. A reactivation of the disease in this patient is not likely.

VITAMINS AND DANDRUFF

To the Editor:—*One of my patients has been told by a non-M.D. skin specialist to take vitamins for his dandruff. I do not wish to be unfair to my patients nor to have them continue taking something which, to my knowledge, will not help. Please comment.*

Martin Karr, M.D., San Mateo, Calif.

Answer.—There is no vitamin used topically or systemically which dependably clears dandruff. A number of scaly and seborrhea-like syndromes in laboratory animals have been described after induced deficiencies of various vitamin and nutritional factors, but such changes have not been consistently reproduced in humans. Riboflavin deficiency may produce certain seborrheic eczema-like changes, seen often at the nasolabial folds. In an American such skin changes rarely respond to the administration of riboflavin alone. The topical use of pyridoxine is reported to be helpful for seborrhea and seborrheic eczema, but this consultant was not able to corroborate these reports. Money spent on vitamins to clear dandruff would be better spent on good food and one of the several modern shampoo remedies for dandruff.

CARPAL TUNNEL SYNDROME

To the Editor:—*What is the relationship of the carpal tunnel syndrome to systemic diseases? What are the diseases involved? Is there any reported association of collagen diseases with this syndrome in the pediatric age group?*

Milton Jabush, M.D., Lakewood, N. J.

Answer.—References to carpal tunnel syndrome are not common in orthopedic literature. They usually deal with the motor and sensory dysfunction associated with compression of the median nerve, which prevails in adults, and children are not mentioned. In more than 60 cases the following points are of interest in relation to these questions: The youngest patient was 29 years of age; the etiology was related to trauma (injury or occupational) or was classified as idiopathic; and in no instance was there any suggestion of a prevailing systemic disease.

Diseases in which there is an excess deposition of collagen are stated by Everett (Medical Biochemistry, ed. 2, New York, Paul B. Hoeber, Inc., 1946, p. 411). The carpal tunnel syndrome is not known to prevail as a complaint in any of these disorders, including those which are most frequently associated with childhood.

PATCH TEST FOR POISON IVY

To the Editor:—*When a suspected sensitive patient was patch tested for poison ivy, three disks of strengths 1:100, 1:1,000, and 1:10,000 were used; the strongest and weakest patch areas showed no reaction, but the other showed a strongly positive reaction (3+ erythema, edema, and a few vesicles). An allergist named this as the prozone phenomenon. If this is true, please furnish a reference which will describe this phenomenon. If false, what is the name given to this reaction?*

R. J. Sexton, M.D., Charleston, W. Va.

Answer.—The prozone phenomenon occurs only in the laboratory and never in vivo. It is seen in precipitation tests and at times in agglutination or complement-fixation tests. It is due to the presence of an excess of antibody. The term "prozone" is

becoming obsolete and is being replaced by "zone of antibody excess." The occurrence of the positive patch tests with the 1:1,000 dilution and not with 1:100 could not be an evidence of a prozone phenomenon. There must have been an error either in technique or in preparation of the disks. It is suggested the test be repeated with the same disks or, preferably, with three different disks of definite known strength. This consultant knows of no reference describing the reaction mentioned. A description of the prozone phenomenon can be found in most immunology books.

STEROID TREATMENT OF ALOPECIA

To the Editor:—*Would methylprednisolone be of value in treatment of alopecia resembling alopecia areata but of traumatic origin? The patient is a 39-year-old man, who seven years ago received second-degree burns on the temporal regions of the head from cosmetics used in a hair treatment. When the scalp healed the burned areas remained completely bald until two years ago. Within the past two years slight hair growth has occurred, spontaneously, but not in sufficient quantity or quality to achieve a good cosmetic appearance. The patient is in good health. The recent conference on hair growth and regeneration held in New York reported that methylprednisolone in treatment of alopecia areata would be of value only if used within five years of the onset of the condition.*

Gerald C. Haskell, M.D., Springfield, Ohio.

Answer.—It is necessary to decide whether the patient has alopecia areata or cicatrizing alopecia secondary to the burns. If the gross clinical features are not distinctive, a biopsy might give the information. If the hair follicles are not completely destroyed, the prognosis is more hopeful. Should this be true alopecia areata without associated cicatrizing alopecia, regrowth of hair is possible, even at this late date. The use of orally given steroids has been followed by hair regrowth in some instances, but hair fall, it is said, recurs when the treatment is discontinued. Such therapy should be reserved for severe types of alopecia areata, totalis, or universalis with realization that steroid therapy may be necessary for a prolonged period of time. Local injection or tattooing of steroids into patches of alopecia areata has given good results in some cases, though superficial atrophy has been observed after such treatment. In this case, since some spontaneous regrowth has begun, it may be best to observe the patient frequently and perhaps use standard stimulating measures such as ultraviolet-ray therapy, painting with mild phenolic solutions, and light dry-ice treatment. In all cases of alopecia areata the prognosis should be guarded but not hopeless.

ISOLATION CARE WITH INFECTIOUS HEPATITIS

To the Editor:—*What is the current recommendation for isolation techniques used in cases of infectious hepatitis? What routine should be used in hepatitis cases after necessary surgical or obstetric procedures have been done? What techniques should be followed in the operating room when unsuspected hepatitis is found during surgery?*

William F. Cox III, M.D., Baltimore.

Answer.—Infectious hepatitis caused by virus A probably is disseminated in fecal material. Rigid hygienic techniques for the handling of infected patients and their feces minimizes the risk of contamination. The patient is regarded as being infectious for about three weeks. If the condition becomes chronic the interval may be longer. In some areas the disease, which may reach epidemic proportions, is most prevalent during the winter and autumn months, so droplet infection has been considered. Water, milk, and other foods, improperly handled, may act as vehicles, especially if the handler be a carrier for hepatitis. The blood stream of a person infected with either virus A or virus B of serum hepatitis carries live virus. Autoclave terminal sterilization of all linens and instruments must be done after operation in patients with known cases and cases discovered during operation. Instruments which will not withstand sterilization by heat should be destroyed by incineration.

STAINING OF TEETH

To the Editor:—*A layman has been told by a prominent pediatrician and a dentist that multiple-vitamin preparations could cause staining of teeth in young children. The dentist advised use of preparations containing vitamins A, D, and C only instead of those containing the vitamin B complex. The child has teeth that look iron-stained, though she has never taken iron preparations. Please give an opinion.*

Beatrice Hawkins, M.D., Brownsville, Texas.

Answer.—Apparently there are no published reports that associate multiple-vitamin preparations with staining of teeth. The materials usually present in vitamin B-complex preparations for pediatric use would not act as chemical stains for the tooth surfaces. It is extremely difficult to stain dental enamel, even with histological dyes. Intrinsic green staining of enamel has been reported in association with a history of neonatal jaundice. The question notes the relationship between iron compounds and dental stain. There is also a possibility that the observed condition may be due to the action of chromogenic bacteria. Such factors may bear further investigation in this patient.

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